



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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D. K. MINOR, and
GEORGE C. SCHAEFFER, { EDITORS AND
{ PROPRIETORS.]

SATURDAY, NOVEMBER 5, 1836.

[VOLUME V.—No. 44.]

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, NOVEMBER 5, 1836.

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Markers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY KNIGHT.

Poughkeepsie, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANGED AND GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,

Chief Engineer N. Y. & E. R. R.

New-York, April 4th, 1836.

Harvey's Flanged and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

Boston, April 26th, 1836.

No. 44—1t.

TWO HUNDRED LOTS will be sold at **NEWBURG**, on Saturday 12th instant. These Lots are in the immediate vicinity of the large Steam Engine Manufactory about to be erected, at the north part of the village of Newburgh—and twenty dwelling houses will be required to be built immediately, to accommodate the workmen. Great inducements are here held out to those who wish to invest in real estate, as twenty dwellings would be taken at once on a lease

for 3 or 5 years, at 15 per cent. on their cost. Further information will be given to any one disposed to purchase and build, on application to this office.

AMERICAN INSTITUTE.

We have in preparation an account of the articles exhibited at the recent Fair, but are prevented from giving it in this number. Cuts of many of the machines will be given.

NEW-HAVEN AND HARTFORD RAILROAD.

We are informed that contracts for grading and preparing the Northern section of this road have been completed so far as it was desirable to pursue them at the present time. Ten out of the twenty-one sections are contracted for, upon terms highly favorable to the interests of the company, and the remainder can be disposed of at will. The work on the southern section is going on with great spirit,—every material is provided for,—and there can be little doubt that, with the present enterprising agents and engineers, a large portion of road will be in operation during the ensuing summer. [Con. Herald.]

CONTINUATION OF THE RAILROAD.

We learn from the Richmond Compiler that the railroad between Richmond and Fredericksburg is now in use to Downer's bridges, about 48 miles from Richmond, leaving less than 16 miles of stage travelling to Fredericksburg. The trip from Richmond to Washington city is now performed in 13 hours. And two lines run regularly each way every day. The hours from Washington are in the morning at half past five and in the evening upon the arrival of the afternoon train of cars from Baltimore. The hours from Richmond are in the morning, at half past five; and in the afternoon at half past one—being upon the arrival of the Stages from the South. [Baltimore Patriot.]

WELLAND CANAL.

We find the following article in the Con-

stitution, of the 28th ult., a paper published at Toronto, U. C. by W. L. McKenzie, who is a violent opposer of the W. Canal Company:—

"We have seen an acquaintance from the Welland canal, who informs us that the trade has greatly increased this year—but that it is almost entirely for the convenience of the Americans—vessels sailing from one American port to another with goods and produce. He doubts whether a thousand dollars of Canadian tolls have been received this year from the shipping. The canal is in pretty good order, and Welland Canal Bank Notes pass very generally among the people. It is expected that the assembly will redeem this paper, and let the improvement of the schools, roads and bridges lie over another year. This would help Oswego and Cleveland greatly."

BRIDGE ACROSS THE HUDSON.

The bridge over the sprout of the Mohawk from Green Island to West Troy is completed. It was built by the Rensselaer and Saratoga Railroad Company, to be used in connection with the bridge from this city to Green Island, for the purpose of crossing the Hudson, and to afford a safe and easy passage at all times from this to West Troy. These bridges are valuable specimens of durable architecture, and will prove a great accommodation to the citizens of Troy, and the travelling community generally.

HARTFORD AND NEW-HAVEN RAILROAD.

The citizens of Hartford will be gratified to learn that this work is in rapid progress of completion. The northern section of the road extending from Meriden to Hartford, was placed under contract on the 14th inst., to be ready for the reception of the superstructure by the 15th of August next.

Should the Co. experience no further delays, the work will soon be completed upon this end of the line, where our citizens by their friendly aid may do much to promote its progress. That part of the road extending from New-Haven to Meriden is in a state of very great forwardness, and the whole works will be completed and the Road in full operation during the next fall. [New-Haven Paper.]

REPORT OF THE PRELIMINARY SURVEY OF THE ROUTE OF THE HUDSON AND DELAWARE RAILROAD, BY JAMES B. SARGENT, ESQ., CIVIL ENGINEER, MADE TO THE COMMISSIONERS OF THE ROAD, AND PUBLISHED UNDER THEIR AUTHORITY.

TO THE COMMISSIONERS OF THE HUDSON AND DELAWARE RAILROAD COMPANY.

(Continued from page 677)

ESTIMATES.

Estimates of the probable cost of both railroads and canals in this country, have usually been deduced from preliminary surveys, and whether the plan upon which they were predicated was or was not pursued in the execution of the work, they have in a vast majority of cases been attended with more expense than was stated in those calculations.

The result has been injurious to the community, and detrimental to that confidence which the importance of the business should have maintained between the projectors of the improvements and the engineers that have planned and executed them. These estimates too have frequently been drawn at length, and much detail furnished of the different kinds and quantities of labor to be performed, all of which were of necessity more or less conjectural, and in the result only exhibited a labored deduction from doubtful and uncertain data.

We shall not therefore attempt in this a specification of the kind and quantity of labor to be expended in grading the whole road: but shall select from the profile a mile of it that is deemed a fair average of the work to be done, and give the estimate upon it multiplied by the length of the road as the probable cost of the graduation.

ESTIMATE FOR ONE MILE OF GRADING.

7,500 Cubic yards of earth excavation at 11 c. per yard	\$825 00
11,500 do. do. embankment at 12 c. per yard	1,380 00
1,100 Cubic yards of rock excavation at 50 c.	550 00
Wood work of Bridges and farm crossings	250 00
Masonry in Bridge Abutments, Culverts, small drains, &c.	700 00
Total,	\$3,705 00

Multiplied by the whole length of the road 45½ miles—gives

\$168,392 25

SUPERSTRUCTURE PER MILE.

31,680 Feet (B. M.) of white pine sills at \$13 per M.	411 84
31,680 Feet (B. M.) of Norway pine rails at \$22 per M.	696 96
1,760 Chestnut ties at 25 cents	440 00
3,520 Red Cedar, Locust or White Oak wedges at \$6 per M.	21 12
Spikes, connecting plates, &c.	110 00
320 Rods of laying track and forming horsepath at \$175	560 00
22 Tons of Iron plate rail at \$70 per ton	1,540 00
Total,	\$3,779 92

Calling the distance 47 miles, as an equivalent for sidelings, gives as a total for superstructure.

\$177,656 24

640 rods of fence at 90 cents—576 dollars per mile; or for the whole distance

26,179 20

MACHINERY.

2 Locomotive Steam Engines, at \$6000	\$12,000 00
8 Carriages for Passengers, at 750	5,600 00
30 Freight Cars at 250	7,500 00
16 Horses and Harness at 100	1,600 00
1 Half of bridge across Delaware,	9,000 00
Depot buildings, turning platforms, &c.	7,000 00

Total, \$44,927 69

Add 3 per cent for contingent expenses,

12,447 83

Total, \$47,375 52

Which is for a single mile including all expenses for machinery, animal power and fixtures of every description necessary to put the road in operation.

\$9,403 20

The above estimates are confidently believed to be liberal; they have been made with the full expectation that they are soon to be tested by the construction of the work; and, although briefly stated, are deductions from much observation on the character of the work to be encountered, and a careful consideration of every part of it.

GENERAL REMARKS ON THE WANTS AND RESOURCES OF THE COUNTRY.

A glance at a map embracing the range of country through which the Hudson and Delaware Railroad is to form so important a part of the line of communication, between the Hudson and Susquehanna rivers, will exhibit the counties of Sussex and Warren, in New-Jersey, in a secluded and unfavorable light, lying on the north of the Mosconeunk Mountains, separated by natural and almost impassable barriers from a participation in the benefits which their sister counties derive from canals and railroads, that are every where spreading over them; affording extensive facilities, ready intercourse with markets, and developing and bringing into active use all their resources—while these two counties, equal and probably superior in natural, agricultural and mineral productiveness to any in the State, remain comparatively isolated, and without any of the advantages so liberally afforded to the adjoining ones. It is therefore evident that, so far as the wants of the citizens can be supplied in this respect, the Hudson and Delaware Railroad is calculated to effect it; hence its construction becomes an object of vital and pressing importance to every citizen that wishes to see those counties rise, in the scale of commercial and agricultural importance to an elevation commensurate with their vast natural resources.

The whole surplus productions of these counties, now find their way to New-York, either through Morris, Essex and Bergen counties in New-Jersey, or through Orange to the Hudson river at Newburgh. They must be hauled over hilly and rough roads at an expense of labor and time that in many instances equals the nominal value of the article transported, which shuts out from market vast quantities of the coarser productions of the soil, that under more favorable circumstances would become items of general exportation, and tend greatly to

enrich the farmer and enhance the real value of his land.

There are also in the mountains bordering the valleys through which it is proposed to construct the road, inexhaustible beds of iron ore, which are now being extensively worked, at Hamburg and its vicinity, while new and wealthy companies are forming, and extensive preparations making to increase the quantity manufactured, and bring it extensively into use. In short, it needs no stretch of the imagination to conceive the iron districts of New-Jersey equal in importance and value to any in the world, for the ore is of the purest and most approved quality, wood is abundant and cheap; and if necessary Anthracite coal from the Lackawana beds, or the bituminous from Bradford county Pa., can soon be obtained at a moderate price: and water power durable and extensive abounds in the immediate vicinity. In fine every facility, and every means necessary to render the smelting of the ore cheap, and for converting the Pigs into any form or shape suited to the market, are its peculiar advantages.

It is also said that Zinc of a superior quality is obtained from the ore which abounds in the same mountains, and that from the abundant quantity that has been discovered, and the successful experiments made in obtaining the Zinc from it that the most flattering hopes are entertained of its future value and importance.

Lime stone appears along the Wallkill, the Pepo Coten, the Paulins Kill, and in short over nearly the whole of Sussex and Warren counties. It is of the first class, and yields a large portion of pure and excellent lime, and may therefore be calculated as an article of transportation, in both directions upon the road.

Slate appears in many places along the line, and particularly as we approach the valley of the Delaware. It has not however been quarried to any extent on the New-Jersey side of the river; but, between Columbia and the Water Gap on the Pennsylvania side, vast quantities are quarried, and machinery on a liberal scale, is constantly employed, in the manufacture of articles from it, suited to the various uses to which it is being so generally and extensively employed.

Dense forests of Chestnut, White Oak, Maple &c., cover the mountains upon either side of the line, and will afford an incalculable amount of valuable timber for market—of Chestnut in particular, there are vast quantities which, will answer the double purpose of furnishing cheap and excellent materials for the superstructure of the road, and of contributing to its business when done.

The water power of the Pepo Coten and Paulins Kill, is of the first class. The latter has its course for about 30 miles in the immediate vicinity of the line, and a fall of 225 feet from Augusta to the Delaware river, together with such concentration at different points as will admit of its application to the most extensive machinery. It is already in partial use at Balesville, Hunt's Mills, Stillwater, Paulina, Marksborough, &c.; and its tributary Mill Creek is extensively employed at Gravel Hill—the completion of the Railroad, will bring the whole into full and active use, and with the abundant materials which the immediate vicinity will supply for the operation of the manufacturer. Sussex and Warren counties will become as important as a manufacturing district, as they are rich in agricultural and mineral productiveness.

But these counties are emphatically ag-

ricultural—the surplus productions of which exceed that of any districts of like extent in the State. Wheat, rye, oats, corn, flax-seed, pork, butter, live stock, &c., are among the important items from them, that yearly find their way to the New-York market.

In the report of the Commissioners upon the Delaware and Susquehanna Railroad, it is stated that Warren county alone "is supposed to produce annually upwards of one million bushels of grain of various kinds for market. It is believed also that it supplies not less than fifteen hundred tons of butter, and a like amount of pork,—and that Sussex county disposes of still greater quantities than those estimated for Warren."

We have somewhat at length alluded to the various local interests that are to be effected by the road and ultimately contribute to its support, and it is believed that sufficient has already been shown, to demonstrate the entire security that the company will have for a rich and full reward for constructing it. But if its own local resources are great and ample for its support, they must be vastly increased by its connection with the works before alluded to. Gypsum, salt, and merchandize of every description necessary for the consumption of a vast range of country that stretches far beyond the limits of the road to the amount of many thousand tons would annually be transported over a part or the whole of it, and access would be given to the vast forests in Pennsylvania, that lie to the south of and adjoining those that have for years afforded to the Hudson and Delaware Canal Company, immense quantities of timber for the use of their works, and for transportation to market. This timber is of the most valuable species; consisting of white and yellow pine, oak, chestnut, birds-eye and curled maple, cherry, white and black ash, poplar and linden, nearly all of which now bear more or less transportation over rough roads to the Delaware river and the adjoining counties in the State; and must therefore be immensely increased by a Railroad passing through the very centre of them, and opening an avenue directly to the city of New-York.

The main and important advantages, however to be gained by the proposed connection with the Delaware and Susquehanna Railroad and the Hudson and Delaware in New-York; will be found in the transportation of the Anthracite Coal, from the Lackawanna valley. These beds are justly considered equal if not superior to any in the State. The quantity of the coal is believed to be inexhaustible, and its peculiar formation in the highest degree favorable for mining. And this too gives to the proposed line of railroad from the Hudson to the Susquehanna river, its chief importance, to the city of New-York and the whole Atlantic border. To the citizens of New-York in particular, who have been accustomed to observe the difficulty in obtaining it, and the constant and uniformly increasing price that it demands, a supply of fuel is becoming an object of the most anxious solicitude. Improvements have extended in every direction and have poured in their supplies of wood from distant forests, and of coal from almost every region where it has been discovered.

Still the demand is constantly in advance of the supply, and with the rapid and unprecedented accumulation of steamboats that ply to and from New-York, the various uses to which steam power is being applied must continue to advance and to rapidly aug-

ment the quantity consumed and exhaust the forests from which the larger portion is now obtained. It is therefore evident that sooner or later recourse must be had to more extended improvements, and that a greater supply must be drawn from coal beds, and it is believed that this can be furnished through the Hudson and Delaware Railroad in as large quantities and at as low a rate as on any other work now in use or that can be constructed.

It has been estimated that coal can be delivered and disposed of at the Water Gap, on the Delaware river, for \$1 50 per ton. If so, then it can be delivered into the New-York market at \$4 00 per ton; but if it should cost 5 or 6 dollars per ton to deliver it in New-York and allow to each of the companies engaged in it a liberal compensation for the transit—this channel would still compete, and successfully too, with any other engaged in the business.

The travel too upon it would be very great. It is well known that the emigration from the east to the west formerly gave preference to this route, and that until the completion of the Erie canal it was deemed the cheapest and most expeditious line of communication. It is, therefore, but reasonable to infer, that with facilities equal to those afforded upon a more northern and distant route, a considerable portion of it would again return to its original channel, particularly that destined for the South West.

We have thus endeavored to allude to the general as well as local resources that the road through Sussex and Warren counties will have to augment its business, increase its revenue and add to its importance, and will now submit a statistical estimate of the business that it would do, and the percentage that it would pay upon the cost if entirely dependant upon its own local resources and its connection with the road leading to the Hudson river at Newburgh.

ESTIMATED ANNUAL RECEIPTS.

30 Passengers daily each way=60, or 21,900 yearly	at \$1 75	\$38,325
4,000 Cords of Wood	" 1 75	7,000
1,500 Tons of Butter	" 1 50	2,250
2,500 Tons of Pressed Hay	" 1 50	3,750
500 Tons of Iron	" 1 50	750
2,000 Tons of Pork and live stock	" 1 50	3,000
100,000 Bushels Grain & Vegetables	" 04	4,000
25,000 Bushels of Lime	" 08	2,000
Rails, Stone, Timber, &c.		1,500

RETURN FREIGHT.

3,000 Tons of Gypsum	at \$1 75	\$5,250
1,200 Tons of Salt	" 1 00	1,200
5,000 Tons of Merchandize	" 1 00	5,000
Total		\$11,450

ESTIMATED ANNUAL EXPENSE.

Interest on first cost (\$42,800)	\$29,960
5 per cent. on the perishable part of the superstructure	6,500
10 per cent. on depots, cars, engines, horses, &c.	2,800
Superintendence, repairs, fuel, &c.	16,000
Total	\$55,260

Deduct the amount from the estimated receipts leaving \$53,375

is the annual net income, or 12½ per cent. on the capital invested.

The estimates of the annual receipts as given above are considered in every item within the actual tonnage that would pass upon the road at its opening—and the effect of such facilities to increase the amount transported to and from countries under like circumstances, is seen and admitted wherever they exist.

Those for the annual expense are known to be liberal and sufficient for even a greater transit than has been stated. Hence it must be inferred that the road even under the most limited circumstances that can exist, will amply and fully sustain itself, and it is therefore unnecessary to enter into any calculation to show how far the tonnage would be augmented and its value increased by its connection with the Susquehanna and Delaware Railroad. That it will be ultimately connected is unquestionable, and that its importance will thereby be doubled, at least, has already been shown.

We shall only attempt to add one more evidence to those already adduced to show the policy of constructing the work, and trust that it will be found so consistent that we shall not be doubted by the most incredulous. We allude to the increased value that will be given to real estate—and shall assume that a cheap, safe and rapid communication between the lands lying within ten miles of, and upon each side of it, and the great commercial emporium, will be enhanced in value to the amount of five dollars on each acre. The distance will be about forty miles from the New-York line to the Delaware river at Columbia, and we will consider it the limits in length. We have then twenty miles in width and forty in length, or eight hundred square miles in the area, which is equal to five hundred and twelve thousand square acres—multiplied by five gives two million five hundred and sixty thousand dollars as the increased value of the lands, or nearly six times as much as the road will cost.

All of which is very respectfully submitted,
JAS. B. SARGENT, Civil Engineer.
NEWBURGH, August 19th, 1836.

BALTIMORE AND SUSQUEHANNA RAILROAD.

OFFICE BALTIMORE AND SUSQUEHANNA RAILROAD COMPANY.

October 11th, 1836.

To the Stockholders of the Baltimore and Susquehanna Railroad Company.

GENTLEMEN:—The President and Directors respectfully submit to you their ninth annual Report of the operations of the Company.

In their last report you were informed that the general route of the road to York had been decided on by the board, after a deliberate examination of the results of the surveys instituted throughout the intervening country. In the past year, two divisions of the "Baltimore and Susquehanna" and one of the "York and Maryland line" railroads, embracing the whole line from Timonium to York, were successively put under contract, as the final locations were completed; and except upon a few small sections, the construction of both roads is now in active progress throughout their entire extent. The "Wrightsville and York"

Railroad, which will connect with the "York and Maryland line" road, thereby forming a continuous line of railroad from Baltimore to the Susquehanna River, is steadily advancing, and will, it is expected, be completed before the road can be opened from this to York.

During the winter and early part of the spring, the unusual inclemency of the weather was such that but little work could be done; and when at length the season became more propitious, the operations of the contractors were unexpectedly retarded by the great scarcity of laborers. Every exertion was made to increase the force employed; but it was found that from the number of public works which were carried on in different parts of the country, the demands for hands was greater than could be supplied. Towards the latter part of the summer, however, the healthiness of the country along the line of our works attracted many from less favored districts; and for some months past the construction of the road has advanced with energy and rapidity. Upon many sections, the graduation and masonry are nearly completed, and throughout the line the amount of work done bears witness to the zeal and diligence of the contractors. The bridges, which will be of wood, under the plan of Col. Long, are also preparing; and the Board have the fullest confidence, that long before the period shall arrive for their next annual report, they will have announced the opening of a direct and regular channel of communication with Pittsburgh, and all the widely extended country which is intersected by the great works of Pennsylvania. The accompanying report of the Chief Engineer will show more particularly the character and amount of the work done on the different sections of the road.

In the month of December last, contracts were made in England for the whole quantity of iron rails which will be required, including an amount sufficient to lay down a new track from Baltimore to Timonium. For, since the construction of that road, experience has shown that true economy prescribes the use of a rail of strength sufficient to bear locomotive engines of considerable weight, whilst it can at the same time be laid down with much less timber than was formerly employed. That adopted by the Board is a modification of the T. rail designed by J. Trimble, Chief Engineer of the Company, which has been highly approved by those qualified to judge of its merits. Being of the weight of nearly 60 lbs. to the yard, it will be simply laid upon wooden sleepers, or stone blocks dispensing entirely with the string-piece. A very heavy and constant source of expense in the annual repairs required upon the wooden superstructure of a railroad, far exceeding the interest upon the additional cost of the heavy iron rails will be thereby avoided, whilst at the same time they can with ease be kept in a proper state of adjustment, and the transportation over them can be carried on with increased rapidity, safety, and economy. The average cost in England of the rails, (of which upwards of 2200 tons have already arrived

here) will be about £10. 6s. sterling per ton; a much lower price than they could have been obtained for at any period subsequent to the date of the contracts. Ten locomotive engines have also been contracted for, in this country and in England: all of which are to be delivered in the course of the ensuing winter and spring.

Before laying down the new rails upon the old division of the road, it is the intention of the Board, if they have the means within their power, so to change its location in several places, as to avoid many of the curves of small radius, which are found to offer much interruption to rapid motion with steam power upon the road. As none can doubt the importance of making as perfect a road as practicable, a road which must always be one of the great avenues from Baltimore to the west, and will for a time be the only one of the same character, it is the earnest wish of the board, and they are fully satisfied that all the means in their power should be used, so to re-construct the old division of the road, as to render the facilities of transportation upon it, equal to those which will characterize the residue of the road to York. As the rails must, at all events, be renewed, it is evident that the desired improvements in the location can be made at the same time at far less expense and inconvenience than at any future period.

With the view of ascertaining the best mode of extending the road into the city, surveys have been made through different streets, but the Board have as yet taken no further action on the subject.

The amount of the loan authorized to be made to the Company from the State Treasury by the act of December, 1834, ch. 241, was One Million of Dollars, the whole of which has been received. This sum was believed by the Board sufficient for the completion of the road to York; and it would probably have been adequate not only to the construction of the road, but also to the procuring of the means of transportation upon it, but for the great advance which took place in the labor and materials after the passage of the act. For instance the price of the common flat bar railroad iron, which at the commencement of the year 1835, was £6 17s. 6d. sterling per ton, had advanced at the time of the contracts made by the Company, to between £8 and £9, and rose in the next month to £11. But the Board were fully satisfied that every motive of sound policy required them to adopt a rail of different form and much greater weight than the flat bar rail: and they accordingly as before stated, selected the one recommended by the engineer, although the usual cost of rails of that description is 40 shillings per ton higher than that of the flat rail. In addition to the enhanced price of the iron, the cost of the new rail is more than five times as great as that of the rail formerly laid down, owing to its much greater weight. The number of tons of iron rails and fastenings required per mile for each track of the new road is 94, whilst upon the old road to Timonium were used not more than 11 tons per mile for a single track. A similar increase in the

wages of labor likewise added to the cost of graduation. Throughout the summer the wages paid by the contractors, have been \$2 and upwards per day.

But notwithstanding the enhanced cost of the road above the estimate of 18 4, arising from the circumstances mentioned above, the Board are yet satisfied that the loan furnished by the State, will suffice for the completion of the road from Timonium to York. For the purpose, however, of procuring the requisite means of transportation upon it, of establishing proper depots, of altering the location of the old road, and of extending it into the city, a greater amount of funds will be required than the Board now have at their disposal. But they cannot anticipate that any difficulties will be permitted to interrupt the successful prosecution of your enterprise when on the very point of its completion; or that after so long and arduously contending with rival States, to regain a portion of that western commerce which was once her own, the city of Baltimore will not be prompt to grasp with avidity, the glorious prize, when it shall be shown to be brought again unquestionably within her reach.

The account of the receipts and expenditures of the Company to the 1st day of January, 1836, has been heretofore submitted to you. From that day to the 1st October inst., they were respectively as follows, viz:

Balance on hand 1st January, 1836,	\$538,543 79
Receipts.	
From State of Maryland,	250,000 00
" Transportation,	12,246 50
" Interest on Loan,	14,499 55
" Sale of Instruments,	205 00
	276,960 00
	\$815,503 84
Expenditures.	
Expenses of office,	1,207 43
Salaries, (Pres. & Sec'y.)	1,811 61
Depots,	301 00
Interest (paid State,)	28,125 00
Transportation,	12,583 64
New Road, viz:	
Graduation and	
Masonry,	186,919 68
Contingencies of	
Construction,	950 01
Iron Rails,	107,253 01
City Division,	167 50
Timonium Division,	353 22
Lumber,	2,017 22
Wagon Department,	1,526 92
Printing and Advertising,	336 25
York and Md. L.	
R. R. Co.,	14,286 09
Damages,	6,454 43
	320,319 23
	364,422 91
Balance on hand,	\$451,180 93

The whole amount of transportation of the year is \$13,283 99, of which \$1,028 46 is not yet collected.

The expenditures for transportation have been increased by the carriage of materials for the new road, for which no charge has been made.

Since the date of this account the last instalment of the loan from the State amounting to \$250,000 has been received, increasing by that amount the balance on hand.

Before concluding this Report, the Board would take occasion to submit for your consideration a few general remarks upon the results which may be anticipated from the

completion of your road. The great works of internal improvement in the State of Pennsylvania, with which it is the primary object of this company to form a connexion on the banks of the Susquehanna, being now in full and successful operation, the effects which have been produced by their completion, are objects of the deepest interest to you, and are of vital importance to the city of Baltimore.

By the last annual Report of the Canal Commissioners to the Legislature of Pennsylvania, it appears that on the 1st Nov. 1835, that State had completed upwards of 600 miles of canal and slack-water navigation, and nearly 120 miles railroad; and that at the same time there were completed or in a course of construction by different incorporated Companies within the State, about 400 miles of canal and 520 miles railroad. This was previous to the very liberal aid which at the last regular session of the Pennsylvania Legislature was extended to works of internal improvement in every quarter of the State; the effect of which will soon become visible in the addition to the foregoing list of many miles both of railroads and canals.

The returns of the transportation upon the works constructed by the State alone, since they were first opened for public use, were as follows, viz:

Years.	No. of Boats.	No. of Cars.	No. of miles trav. by pas.	Amt. of tolls received.
1830				27,012 90
1831				38,241 20
1832			152,780	50,909 57
1833			878,315	151,419 69
1834	664	349	1,408,191	309,789 15
1835	760	774	11,231,924	684,357 77

The receipts by the State as above, were exclusively for tolls and for the use of motive power on the railroads, which is furnished by her—the transportation being carried on, and the freight of course received by individuals and companies. The payments to the State for the year 1835, were—

For amount of tolls on canals	\$403,068 43
For " " on railroads	194,623 24
For motive power on " "	86,726 10
	\$684,357 77

The quantities of a few of the principal articles transported, were as follows, viz:

Flour,	263,662 bbls.
Wheat,	243,559 bush.
Corn and other grain,	393,315 "
Tobacco,	6,715,542 lbs.
Iron,	53,797,710 "
Merchandise,	36,859,711 "
Groceries,	23,335,993 "
Leather,	1,664,718 "
Mineral Coal,	121,995 tons.
Whiskey and Dom. Spirits,	1,241,384 galls
Sawed Lumber,	14,528,557 feet.

From the above statements some idea may be formed of the vast amount of that internal trade, which circulates throughout the State the life blood of her prosperity, and of which the amount during the present year is understood to have far exceeded that of any former period.

But the value of the Pennsylvania works is not to be estimated solely by the magnitude of the trade which is even now trans-

ported over them. By the progressive completion of the various lines of communication West and North of Pittsburg, the commercial importance of that place and the amount of internal trade which will there centre, must every year be rapidly augmented; whilst the resources of the region of country traversed by the improvements which follow the North and West branches of the Susquehanna have scarcely yet begun to be developed. And by the railroad communication now forming between Williamsport, on the west branch canal, and Elmira or New-Town, situated on the New-York and Erie railroad, an avenue will be opened to the fertile regions of the Genesee, and a connexion will be formed with both the Erie canal and the New-York and Erie railroad, at points from both of which the distances to the city of New-York will much exceed those to Baltimore.

It is to the Baltimore and Susquehanna railroad that we look to secure to the city of Baltimore a participation in the immense trade of which we have spoken. The great line of communication from Pittsburg to the Atlantic cities, is by canals and the Portage railroad, to Columbia; and thence by the Columbia railroad, a distance of 18½ miles, to Philadelphia. From Columbia to Baltimore the distance by the railroad now constructing will not exceed 70 miles. We will therefore have the same mode of access to the Pennsylvania canals, which is enjoyed by Philadelphia, with the difference of distance in our favor, and on the other hand, will be given to the agriculturist and manufacturer of Pennsylvania, the reciprocal advantage of being enabled, after transporting his commodities to Columbia, there to enjoy the benefit of a choice of markets between the two rival cities, each striving to offer such inducements as may attract his custom. The distance from Pittsburg to Baltimore by this route will not exceed 382 miles; and if it be the interest of the citizens of Pennsylvania to open the cheapest and shortest routes to the markets for their produce, the construction of a railroad from York to Harrisburg will probably effect a further reduction in that distance of at least ten miles.

The distance from Lake Erie to Elmira by the New-York and Erie railroad will be 205 miles, and thence to New-York 303 miles, whilst that from Elmira to Baltimore by the railroad to Williamsport, and thence by the Pennsylvania canals, will be but 245, a difference in favor of Baltimore of 58 miles.—From Elmira by the Chemung canal, the Seneca lake and Seneca canal, the distance to Montezuma, on the Erie canal, is 84 miles, making the whole distance from Baltimore to Montezuma 329 miles, whilst that from Montezuma, to New-York by the Erie canal is 366, a difference in our favor of 37 miles. Through the Susquehanna route, therefore, the city of Baltimore will be placed nearer to lake Erie than is the city of New-York, and may enter into competition with her for that trade of which the latter has now the monopoly; and that this route will become the grand and national channel of communication between the North and South for travellers, and for

United States mail, cannot be questioned, since from Lake Erie to Baltimore the distance by it will be but 450 miles, whilst between the same points, by the route via New-York and Philadelphia, it will be 906, a difference of 256 miles.

Such are the benefits which the city of Baltimore has to expect from the completion of your enterprise. The disadvantages under which the traders have labored, have been sorely felt; and during the past year it has in repeated instances happened that sales have been effected in this city, of goods destined for the Western markets, only on condition that the vender would at his own cost deliver them in Philadelphia, whence they were to be transported along the canals of the Susquehanna valley. But when a direct communication shall be afforded from Baltimore to the same canals, a wide field will be thrown open to the commercial enterprise of her citizens, and all their energies will have ample room for exercise. Like the magnificent Susquehanna itself, the commerce of a region almost unbounded in extent, will flow from a thousand sources, until uniting upon her banks, it rolls along in one wide stream of wealth.—Through your exertions, Baltimore will be enabled to enter upon favorable terms into the zealous competition with which her rivals seek to divert to themselves the fertilizing branches of this mighty current, and to the activity and industry of her citizens may we safely trust to avail themselves of the advantages you will have placed within their reach.

With the prospect then of at length reaping the full reward of your labors, the President and Directors cannot but offer their congratulations to the stockholders, upon the advance of their work towards completion. Looking to all the considerations which give value to a railroad, the Board still entertain the most confident belief that the revenue which the Baltimore and Susquehanna railroad will yield, will fully justify the most sanguine expectations which they have held forth, and they as firmly trust that the advantages which will accrue from it to the city of Baltimore will be at least as great as have been represented.

By order of the Board,

CHAS. HOWARD, President.

FIRST ANNUAL REPORT OF THE BOARD OF DIRECTORS, TO THE STOCKHOLDERS, OF THE HARTFORD AND NEW-HAVEN RAILROAD COMPANY.

To the Stockholders of the Hartford and New Haven Railroad Company:

The Board of Directors submit the following as their first Annual Report upon the affairs of the Company:

The Board being organized, the first duty which devolved upon them was the appointment of the proper agents. As soon as arrangements could be made, the Engineer was directed to examine, and whenever such a course would be advisable, thoroughly survey those parts of the State lying between Middletown on the east, and the Farmington Canal on the west. This was directed with a view to ascertain whether any route could be found more feasible than the one designated in the Preliminary Report of the Engineer, on which was pred.

ated the original estimate of this work.—The Board were induced to adopt this plan, because they believed it a duty which they owed, not only to the Stockholders, but to the State. They were aware that the location of the work would thereby be subject to considerable delay; still, having in view the importance of this road—which presents a fair prospect of being, at no distant day, the great trunk or outlet of the valley of the Connecticut—drawing its resources from Canada—intersecting the great Western Railroad, between the State of New-York on the west and Boston on the east, in addition to other great advantages which might be mentioned—it appeared to them clearly expedient, that in locating so important a work, no reasonable time or expense should be spared, to ascertain that route which should prove the *very best*. Careful and extensive surveys have accordingly been made, embracing in the whole some hundreds of miles, with estimates and comparisons of the different routes; which will not only enable the board, as it is presumed, to give a good and sufficient reason for the route they have selected but also render clearly unnecessary, any subsequent examinations with a view to rival routes, which might have been the result of a less thorough examination. Much valuable information has been also obtained, which may be important for purposes of future reference.

Large maps of the most prominent routes are in the possession of the Company. For more particular information on this subject, the Board refer to the Report of A.C. Twining, Esq. Chief Engineer, which is appended to this Report.

It might reasonably be expected, that in locating so important a work as a Railroad, which is to be *permanent and fixed* for ages, care would be taken to bring into comparison and competition the various local interests to be affected thereby. In order, therefore, that there might be a fair representation of those interests, as well as a just estimate of the resources of the various routes, much pains was used to elicit information on all the various subjects which would have a bearing upon the question; in relation to all of which, arguments offered by the friends of the different routes were patiently and publicly heard, and received their due weight in deciding the location. It may, however, be proper to remark, that the circumstance of their being different routes which were feasible, and each possessing its peculiar advantages, placed the Board in a condition less favorable for prompt decision, than that ordinarily devolving on similar agents, who often find themselves limited in their choice to a single line,—and that too, less promising than either of the routes subject to the decision of the Board.

The general location having been settled definitely, the attention of the Board was directed to obtaining titles to land. It is well known, that in many public works of this kind, much embarrassment has been occasioned by a hasty and premature entrance upon property of that kind,—a want of a due regard to the rights of the occupants,—and a neglect to obtain good titles. On this subject, as well as others which came under the attention of the Board, they deemed it prudent to avail themselves of the experience of others, and obtain the land by private arrangement, and avoid, if possible, availing themselves of the extreme, though necessary powers, which, by a provision in the Charter, the Legislature has given them. With a view to accomplish so desirable an object, the Board employed judicious agents,

who were directed to offer the full value of the property, having in view the advantages and disadvantages resulting from the Railroad. The agents have, in most cases, been successful; and there remain but few unextinguished titles on the location as far as Meriden,—the money, with few exceptions, having been paid and deeds taken.—For the amount of this and other applications of the funds, reference may be had to the Secretary's Report. The amount paid under the head of land, includes fencing and keeping the same in repair, land, damages, &c.; and although it may seem large, the Board believe, that in the result, it will prove better for the Company than if the same titles had been obtained at much less prices through the intervention of appraisers. It may also be proper to remark, that more land has been taken than would in all cases have been judged immediately necessary, unless the Board had taken into consideration, that this work is located, not for a few years only, but for centuries; and, if provision were not now made to meet the increase of business and other contingencies, an error might be committed which could hardly be remedied. Should the land, however in any case, be more than shall be wanted, it can always be made available at an advance from cost. These remarks, in addition to their immediate application, are intended to intimate the necessity, in relation to all matters relating to this work, of a large and extended view of things connected with it, whether immediately or remotely; by which course numerous evils will be avoided, which might otherwise be of incalculable injury.

The termination of a Railroad, and its connection with other means of conveyance, is a subject of paramount importance. To this subject the attention of the Board was early directed, in relation to this Railroad; and, while the termination at New Haven was designated by the Charter, it was found, that great obstacles were in the way of obtaining the facilities necessary to connect with water transportation, by reason of the great expense of constructing wharves to the channel of the New-Haven harbor. At no point did it seem practicable, at present, to form this connection with the harbor, but by passing upon Tomlinson's Bridge, so called. To the forming an arrangement with the Bridge Company, on terms at all consistent with the interests of this Corporation, there were interposed great obstacles: 1st. The only wharf at which a steamboat could lie, was leased for a term of years. 2d. The freight transported by the Railroad Company would be subject to a wharfage which, even at a low rate, would amount to a great sum annually. The great price of the ground, the inconvenience and expense to which the Company would be subject for wharfage of materials in constructing their Road, and many other circumstances which would embarrass the connection with water transportation, induced the Board to employ an agent to purchase the major part of the stock of the Bridge Company. This purchase was made in accordance with the recommendation and approval of the Engineer, and, on this subject, the Board feel an assurance, that the purchase is a great acquisition to the Company, and will eventually very materially affect its receipts,—being a most valuable property, affording the most desirable facilities of access to steamboats, and at such places, and on such terms, as best accord with the requisitions of the Road.

The Bridge Corporation, although under the control of this company, sustains its distinctive features, agreeably to the act of in-

corporation; and when the purposes of the Railroad shall have been secured and answered, that stock may be disposed of.

In order to facilitate the business of the Railroad Company, as well as to accommodate the usual business at the bridge, the Bridge Company have contracted for the construction of an additional wharf or dock, for the repair of others, and the excavation of the contiguous mud to such an extent as to enable vessels drawing the usual depths of water to come up to the wharf. For these purposes the Railroad Company have authorized a loan to the Bridge Company of \$10,000. This appropriation, besides being indispensable for present purposes, will be the means of bringing a great accession to the permanent income of the bridge. Other improvements in wharves are in progress, the expense of which will be principally defrayed from the income of the bridge and wharf, and which will add much to the value of both.

The Board, aware of the importance of availing themselves of all proper means to promote the present and future prosperity of this work, have desired to take an enlarged view with reference to that object. In addition to what has been referred to on this point, they have deemed it very important to bring under the direction and supervision of the Company, as far as practicable, the manufacture of cars and transportation carriages; not only to save expense in first cost, together with the expenses and trouble of transporting so bulky an article, but also with a view to have always on hand that practical knowledge which is so important in a work of this kind, especially as respects repairs. For this purpose the Board have established a car manufactory, which is in successful operation, and will enable the Company, it is presumed, to furnish the necessary cars and transportation carriages for the opening of the Road.

In order to meet the current expenses of a work of this kind, it must be obvious that reasonable provision should be made in advance. This makes it indispensable that the installments should be punctually paid. No plan, however well matured and faithfully executed, can succeed without it. To insure the success of the work, punctuality in all the pecuniary concerns is of paramount importance; by which the interest of the stockholders will be greatly promoted, and the expectation of the public answered in the early completion of the work.

By the Treasurer's and Secretary's reports, which are appended to this report, may be seen at one view, the amounts which have been paid, under the various heads of expenditure; which it is presumed will satisfy the stockholders that the disbursements have been made with economy and prudence.

There are some outstanding claims which could not be settled at present. The Company is also indebted for work done by contractors, which could not be closed, being held in reservations agreeably to the contracts. The fourth installment is designed to pay for the land from Meriden to Hartford, and meet the engagements of the Company, which are rapidly increasing upon them as the work advances.

On the subject of installments the Board have to acknowledge a very prompt payment by most of the stockholders, whilst they extremely regret the backwardness of some. It would seem that a sense of honor, and the importance of the enterprise, would be a sufficient reason to insure punctuality. It was hoped that this stock was taken for other purposes than speculation, and with reference to its intrinsic value.

The Board regret extremely that any coercive measures should be necessary, and cannot but indulge the hope, that delinquents will save the Board from any legal proceedings, as unpleasant to themselves as it must be to the holders of the stock. On this subject the Board deem it proper to state, that a few of the stockholders who have not paid reside at a distance; and some, in places not known to the Board; and some of the persons who held stock are deceased, and the claim has been represented to the administrators.

It may perhaps be expected by the stockholders, that the Board should give their views with regard to the present and future prospects of the Road. They would therefore state their opinion, that the present condition of the work is encouraging, and they see no reason why the stock should not sustain an intrinsic value above what it did when the subscription was made. And, as to the future prospects of the Company, two circumstances deserve particular notice.

1. The peculiar location of the Road, giving a reasonable prospect of its extension up the valley of the Connecticut, besides intersecting the great Western Railroad.

2. The advantages which the Company would derive from its connection with a line of boats to New-York, and the other circumstances which are inferable from the same.

If we may be permitted to draw an inference from past improvements, we can hardly estimate too largely the increase of the business of the Road when completed. While many other similar works are prevented from being available for a great part of the year, in consequence of being connected, in the line of transportations, with rivers and canals, which are closed with ice; it is obvious that a route which ensures so constantly the means of transportation, is of great importance, in comparison with those which are unavailable for a considerable part of the year.

It is reasonable to conclude, looking to the vast resources of the country and the line and connection of this road, that the travel and business will increase in a ratio vastly beyond the first impressions of its friends. The truth of this remark time alone will determine; but it will not be thought a strange one, when, it is considered, that it is now but fifty years since the only means of public transportation, from this city to Hartford, was a common two-horse wagon, and that was thought, at the time, a hazardous experiment.

In conclusion, the Board would state, that they believe the Hartford and New-Haven Railroad an important enterprise, as a means of facilitating travel and business, and entitled to the confidence and co-operation of the stockholders and the public.

The Board would also further state, that, in their opinion, the section of country where the road is located, is vastly interested in maintaining the work in self-defence; for while facilities for travelling and transportation are afforded to other portions of New-England, east of us, it must be obvious, that if the same facilities are not provided here, a loss will be sustained which cannot be regained. All of which is respectfully submitted.

By order of the Board of Directors,
JAMES BREWSTER, President

ENGINEER'S REPORT.

To James Brewster, Esq., President of the Hartford and New-Haven Railroad Company.

SIR.—In compliance with your request, I

respectfully present this report, giving a condensed view of all the operations which have been undertaken and executed in the Engineer Department for the year past; also embracing a view of the present state of the work and its prospects for the year to come.

Immediately after being called to the charge of this work, in the fall of 1835, it was made my duty to examine a route by the way of Middletown, and, if expedient, execute a careful survey. It was always known to those in the least acquainted with the merits of the different routes, that a line by the way of Middletown must necessarily be longer, and must pass over higher ground than other lines which had been surveyed originally for this Railroad. Still it was the opinion of a large body in the community, that the advantages of such a route, in a fiscal point of view, to the company, would overbalance its physical disadvantages. It was therefore judged expedient to give to that large section of the State, which felt itself deeply interested in the location by the way of Middletown, the opportunity of the most careful selection and location among the different routes which existed in that region, and a full and fair opportunity to represent their resources, and the amount of income which they would offer to this road. Other very weighty reasons presented themselves for this course, having reference both to general principles and the facilities for procuring land upon favorable terms by the competition which would be created. Two parties were accordingly employed for about two months in exploring the whole region, and the best route which could be found was carefully located. The result was, that although that route was not finally selected by the Board, yet all its friends, so far as is known, feeling that the most careful attention had been given to their claims, by the Directors of this work, and perceiving for themselves, in the comparison of their favorite route with the one which was finally adopted, the great superiority of the latter, acquiesced entirely in the correctness of a location out of their own immediate region.

As soon as the Middletown explorations and location had been completed, attention was turned to the middle region, by way of Meriden and Berlin. In the original surveys it had been found that two routes existed in this region south of Berlin into New-Haven; one on the east and the other on the west of the Quinnipiac river, which were very equally balanced in their expense and in their physical character. A line was accordingly located on each side of the river, for the purpose of an accurate comparison. An entirely new route was also laid, which passed east of the village of Worthington, crossed the Madebeset river about one mile north of that village, at an elevation of nearly seventy feet, and continued directly through Newington, and east of the quarries of Rocky Hill, into Hartford. An attempt was also made to enter Hartford from the south, by connecting the route last named with the northern part of the Middletown route, by running up the valley of a brook which comes down the vicinity of a small settlement called Griswoldville, into what is called Beckley Quarter, north of Worthington.

It was deemed important that the subject of location should be in readiness for the decision of the Board as early as February; and the foregoing operations had consumed the time allowed, so nearly, that no time was left for any thing more than a hasty and rapid examination of a third general

route, which was from the first known to exist, and to possess many probable advantages. Examinations, however, were made to such an extent as would enable the Board (it was judged) to decide respecting the comparative merits of that route. The whole matter of location, however, having been made subject, by a clause in the charter, to the revision of three commissioners, appointed by the State, was by them laid over till a particular survey and location of the last mentioned route should have been made. Being therefore directed by the Board, I executed this survey and location, all of which, together with the estimates, was completed in the beginning of April, on the 7th of which month, it will be recollected, that the line by way of North-Haven, Wallingford and Meriden, was finally selected by the Board, with the sanction of the commissioners, leaving the northern portion of the route, from Meriden to Hartford, open for future decision.

This first division of the road as far as Meriden, being the southern half of the entire route, after having undergone a thorough revision wherever improvements could be made in the line, was immediately prepared for contract, and early in the month of June, was put under contract, so far as the grading is concerned, to three responsible and able companies. The entire preparation of the road for a double track, is by the contracts, to be complete by the months of April and May, 1837.

A prominent reason on the part of the Board for delaying their decision respecting the northern division of the route, from Meriden to Hartford, had been the variety of questions which would present themselves respecting the proper entrance into the latter city, and the fact that the doings of the Board were subject,—to the extent of the city limits,—to the sanction of the authorities and freemen of the same. But after the negotiations between the President of the Board and the authorities and freemen of that city, in the result of which the entrance was fixed upon, to the entire satisfaction of the citizens, no time was lost in bringing before the Board the entire subject of location to Hartford. The line which has been before alluded to, as being laid east of Worthington through the village of Newington, having been abandoned by reason of the great expense of crossing the Madebeset river, added to a strong and earnest petition of most of the influential inhabitants of Newington, desiring the removal of the line from their vicinity, there remained no route but that one which passes through the meadows called the Green Swamp, and the parish of Kensington. A portion, however, of this last named route was, by direction of the Board, re-surveyed, at the request of the citizens of Worthington, with a view to accommodate, if feasible, that village with a line coming into immediate contact with them on the west. The decision of the Board, made on the 30th of August, in favor of the Kensington portion of the route, together with the sanction of the commissioners, completed the entire location of the road from New-Haven Harbor to Hartford Main street. This division last located, from Meriden to Hartford, is in a condition to be put under contract immediately.

While the foregoing detail exhibits the fact that various feasible routes existed, possessing each its claims to attention, and being dispersed over three distinct districts, separated from each other by chains of mountains and highland, let it also be observed that these surveys have exhausted

the entire subject, from the Farmington canal on the west, to the Connecticut river on the east; so that it has become a perfect certainty, that the line as it has been finally fixed, has no equal in all that region, either as respects its physical characteristics or its cost of construction,—and while the foregoing considerations have reference to the road, viewed especially in its adaption to the long travel, and as a link of the chain which is probably destined to reach to the upper extremity of the Connecticut valley, it is no less true that this particular route is better accommodated to the local business and circumstances of the intermediate country between Hartford and New-Haven, than any other could be. After departing from New-Haven, it cuts into the midst of the clay beds of North-Haven, where several millions of bricks will annually be made; it skirts the villages, first of North-Haven, and next of Wallingford; it passes into the immediate vicinity of Yalesville, directly through Meriden lower village, and one half mile only from the upper village,—comes near to the cement factories, the mill seats and clay beds in Kensington, and is distant but about one mile and a half from each of the villages of Worthington, New-Britain and Newington. At the same time it is so located in the middle district, between the Connecticut river and the Farmington canal that during the season when they are closed, and for nearly or quite five months of the year, its influence will reach Middletown on the east, and Farmington, Bristol and So. thington on the west. I should not omit to mention the circumstance, that, although this road will come into immediate contact, for three-fourths of a mile, with the city of New-Haven, and terminate at the deep waters of the harbor; and although at its northern extremity it will deliver its passengers and freight in the very heart of Hartford, but a few rods south of the State-House, and on the Main street, still a change of power will not be necessary at either extremity, nor for any part of the distance.

I shall conclude that part of the subject which relates to the surveys and location, by observing, that on all the routes the aggregate distance which has been surveyed, located and re-located with precision, amounts to about three hundred and fifty miles. This has been done chiefly with two parties, and, to a considerable extent, in the winter season.

With respect to the present condition and future prospects of the work, a few brief remarks will suffice. I have already mentioned that the upper division, from Hartford to Meriden, can be put under contract without delay. On the division from Meriden to New-Haven, which has been under contract since June, the contractors are actively engaged upon the prominent sections of heavy work. The iron rails are contracted for, also the cross sleepers for the entire road. Negotiations for the wooden rails are far advanced, and two engines have been ordered, which will be finished as soon as they can possibly be required. There is, therefore, nothing to forbid the expectation that this work may be wholly or nearly finished from New-Haven to Hartford, in fifteen months from the time of putting the upper division, from Hartford to Meriden, under contract.

I am, Sir, very respectfully,

Your Obed't Serv't,

ALEXANDER C. TWING, Engineer.

SECRETARY'S REPORT.

To the President and Directors of the Hartford and New-Haven Railroad Company.

GENTLEMEN,—I herewith submit the following report of Disbursements, in constructing the road of this Company.

The total amount of moneys expended for the Company, up to September 5th, 1836, is

Of this sum there has been paid, expenses for obtaining the Charter of the Corporation, for expenses by Commissioners in opening the books for subscription to the Capital Stock, for books, stationary, furniture, fuel, lights, office rent, &c.	\$107,009.64
For expenses of Engineering, For land and damages, (including Agencies,)*	4,473.82
For cash paid in part for the purchase of fifty-seven and a half shares of bridge stock, For a loan to the Bridge Company for building a wharf, For building of cars and the materials, For Graduation, For Salaries,	10,147.15
	57,816.27
	20,609.63
	3,500.00
	2,183.74
	6,279.00
	2,000.00
	\$107,009.64

The indebtedness of the Company is as follows:

Notes given for the purchase of lands,	\$12,000.00
Notes given for the purchase of bridge stock,	37,350.00
Sundry small accounts,	40.75
Balance due on Salaries,	1,800.00
	\$51,190.75

TREASURER'S ACCOUNT CONDENSED.

William H. Elliot, Treasurer, in account with the Hartford and New-Haven Railroad Company.

1835.	Dr.
Sept. 5, To Cash, first installment,	\$50,000.00
1836. Jan. 16, to Aug. 25, To Cash from Union Bank,	48,215.00
Feb. 16, to Sept. 3, To Cash from Phoenix Bank,	21,117.63
Aug. 23, To Cash from Morgan Ket hum & Co.	1,699.03
Aug. 23, To Cash from O. Pease, Secretary,	22,160.23
Aug. 23, To Cash from Interest accrued,	1,132.68
	\$144,324.63

1836.	Cr.
Sept. 6, By bills receivable,	\$22,714.75
Sept. 6, By check to James Brewster, for error,	45.00
Sept. 6, By orders paid to this date,	107,009.51
Sept. 6, By funds in Treasurer's hands,	14,555.33
	\$144,324.63

*This item includes land, fences, and damages, for the line of the road, and also the payments made for the following pieces of property:

Car Factory and lot of land in New-Haven,	\$4,000.00
Land and buildings purchased in Hartford,	4,000.00
Land purchased of Pardee and others, at the termination of the road in New-Haven,	16,000.09
Land in North-Haven,	1,000.00
Several smaller pieces of land,	3,000.00
	\$28,000.00

Leaving amount paid for line of the road and Agencies. \$29,870.77

From the Jerseyman.

RAILROAD TO CARPENTER'S POINT.

The public have been anxiously looking for the report of the Engineers who surveyed the railroad route from this town to Carpenter's Point. A letter from E. Beach, Esq., the Chief Engineer, to the Commissioners, gives the information that A. H. Jackson, Esq., the accomplished Engineer and Surveyor who run the route, took sick whilst making out the report, and died on the 21st ult., which caused the delay. A letter from Mr. Jackson to Mr. Beach, dated the 12th of August, was enclosed, which gives a sketch of the bearings, distances and elevations, and from which we have been permitted to make the following extracts:

"The Kittaninny, or Blue Mountain, running nearly parallel with the Delaware River from Carpenter's Point to the Water Gap, has ever been considered a serious objection to the construction of any feasible or expeditious communication between the north-west parts of New-Jersey and the city of New-York. Culver's Gap, so called, presenting the only practicable indenture or ravine by which the elevation of the mountain could be overcome, I commenced the survey at that place, three miles north of Branchville, running to the line of the State of New-York opposite Carpenter's Point, distant 18 $\frac{1}{2}$ miles, and 496 feet below the starting point, on a slope rising to the east. Soil generally composed of detached gray rock, gravel and sand.

"Continuing the survey from Culver's Gap southerly to Branchville, 7 $\frac{1}{2}$ miles, 334 feet below the Gap. Here it was deemed necessary to survey two routes to Dover; the Western, through Newton and Stanhope, and the Eastern, through Sparta and Berkshire Valley. The principal difficulty anticipated on the Western route was, in crossing the Scott's or Sparta mountain, between Stanhope and Andover, I there re commenced at a point 225 feet above the water in the Morris Canal at Stanhope, and running along the stream of the Lubber's Run, crossing Scott's Mountain at Cal Swamp, thence through Andover and Newton to Branchville, 22 $\frac{3}{4}$ miles from Stanhope, and 275.47 feet below the same, making Culver's Gap 59.01 feet above Stanhope.

"The Eastern route commenced at a point 5 $\frac{1}{2}$ miles south of Culver's Gap, diverging to the east from the Western route, passing through Lafayette, 12 miles from the Gap, and 363.23 feet below it. To Sparta 18 $\frac{1}{2}$ miles from the Gap, and 162.20 feet below it. Thence crossing Sparta Mountain through a ravine to the head of Brookland Pond, or Lake Hopatcong, 23 miles from the Gap, and 8 feet above it.—Down the east side of the lake to 1 mile west of Dover, 30 $\frac{1}{2}$ miles from Culver's Gap, and 296.58 feet below it.

"Continuing the survey of the Western route from Stanhope to the point of stopping the Eastern west of Dover, 8 $\frac{1}{2}$ miles, and 237.57 feet below Stanhope, gives the Western route 35 $\frac{1}{2}$ miles from the Gap.

"From Dover, through Rockaway and Denville, by the head of Speedwell Pond to the Liberty pole on the Morris Green, it is 543.82 feet below Culver's Gap, and 61 $\frac{1}{2}$ miles from Carpenter's Point by the Eastern route.

"The graduation of the route from Carpenter's Point to Morristown by the Western route will in no instance require more than 60 feet ascent per mile in travelling northward, and with but two exceptions not over 40 feet per mile in travelling southward; in these two instances for a short

distance the graduation will necessarily be 60 feet ascent per mile. The line of survey on both routes is generally on a gradual slope, requiring but little cutting or embanking, and the soil in most cases of a kind easily excavated, and calculated to form permanent embankments, being principally loose stones and gravel. The bridges and culverts required are inconsiderable when the length of the route is taken into consideration; and the most durable materials for their construction abounds in exhaustless quantities on the route. Timber and stone of a good quality for the superstructure of the road are abundant along the line. These remarks are applicable to both routes, in every respect, excepting the graduation of the line on the eastern route from Sparta to the head of Hopatcong Lake, 4½ miles, where it will be necessary, in order to cross the Sparta Mountain, to assume a graduation of about 100 feet per mile ascent and descent, and a like graduation will be necessary in descending from Seward's Mountain into Berkshire Valley, about 2½ miles.

"The route across Scott's and Seward's Mountains was surveyed in reference to a decrease of distance between Sparta and Dover of about eight miles. Another route, with a graduation of from 40 to 60 feet ascent and descent per mile, was partially examined from Sparta, following the Brogden Meadow Valley, and passing Stag Pond, Lubber Run and thence up a ravine and intersecting the western route at the feeder from the lake near the Morris Canal, distance about 10 miles from Sparta. In this case the two routes would be nearly equal as regards distance and graduation, providing the western route should be continued up the Lubber Run valley from Mr. White's, and intersect the eastern at or near Rose's school-house, about 1½ miles distant, which would leave Stanhope 3 miles west, and the route equally practicable."

From the Georgian.

RAILROAD CONVENTION MEETING

At a meeting held at the Exchange on 15th October, 1836, for the purpose of taking into consideration the propriety of sending Delegates to the Internal Improvement Convention, to be held at Macon on the 7th day of November next, the Hon. John C. Nicoll was called to the chair, and Col. M. Myers nominated and appointed Secretary.—The chairman opened the meeting by stating its object.

The Hon. James M. Wayne then addressed the meeting in a very perspicuous and able manner, detailing the material occurrences which took place at the Knoxville Convention, in July last, pointing out the different routes which had been proposed there, for the contemplated Railroad, and the advantages which would result from each. He designated other routes, and pointed out the benefit the State generally would derive from their being adopted. He presented to the meeting a very comprehensive view of the geographical advantages possessed by the State, the facility with which she could be connected with the West, and the mutual commercial importance to be derived from such a connection—he stated that the Convention intended to assemble at Macon, was of vital interest to our city, and the State generally, and the necessity of discarding all sectional feelings, and uniting for the improvement of the whole State. Judge Wayne displayed a perfect knowledge of the subject before the meeting. After Judge Wayne had con-

cluded, Dr. Arnold offered the following resolution:—

Resolved, That it is important that the county of Chatham and city of Savannah, should be represented by Delegates, in the Internal Improvement Convention proposed to be held at Macon on the first Monday in November.

Resolved, That a committee be appointed to make a selection of Delegates and that the Corporation of the city, be requested to make an appropriation of money, to defray the expenses of the Delegates.

Resolved, That in sending Delegates to said Convention, the citizens of this county and city, disclaim all wish of any sectional or local interest of the county or city, and that they are animated by a sincere and honest desire alone, to contribute to the general welfare of the State, by the adoption of a system of Internal Improvements, which will give to every section of the State equal benefits.

The following committee were appointed by the chair to nominate Delegates to the Convention.

COL. W. T. WILLIAMS,
THOMAS PURSE,
JOSEPH WASHBURN,
DR. R. D. ARNOLD,
ROBT. HABERSHAM.

On motion the meeting adjourned.
JNO. C. NICOLL, *Chairman*.
M. MYERS, *Secretary*.

From the London Mechanics' Magazine.

LONDON AND BIRMINGHAM RAILWAY.

REPORT OF THE DIRECTORS TO THE SIXTH HALF-YEARLY GENERAL MEETING OF THE PROPRIETORS, HELD AUGUST 5, 1836.

The Directors have the satisfaction to announce to the Proprietors, that the progress of the works generally, in the last six months, has been such as to warrant the expectation which was held out at the last meeting, that the whole line will be completed by the summer 1838, and the first twenty-one miles from London in the spring of 1837.

Of the Primrose Hill Tunnel, which is 1105 yards long, only 114 yards remain to be made; the Kensal Green Tunnel is finished, and traversed by the Company's locomotive engines; 1423 yards are completed of the Watford Tunnel, the total length of which is 1793 yards; and the difficulties which were presented by the quicksand in the Kilby's Tunnel have already been so far surmounted, as to leave no doubt in the mind of the Company's engineer, that they will not delay the opening of the railway beyond the time mentioned. With reference to the other portions of the work, the Directors are making every exertion to forward them, so as to give the Proprietors the benefit of a revenue at the earliest possible period; satisfied that although for the attainment of this object an additional charge will be incurred by the Company, the advantage to be derived from it will be more than commensurate to the expense.

The Directors have entered into a contract, under the guarantee of two responsible sureties, with Mr. Edward Bury, of Liverpool, an able and experienced builder of locomotive engines, for the conveyance of passengers and goods, on the railway, by locomotive power, to whatever extent may be required, at a fixed rate of remuneration;

the Company providing engines of Mr. Bury's specification, and Mr. Bury, on his part, maintaining and keeping them in repair; the contract to be in force for three years from the opening of the railway.—The Company have thus assured to themselves the advantage of locomotive power at a uniform and moderate rate, and under a system of management which it is the interest of the contractor to render mutually beneficial to the Company and himself.—The Directors have also contracted for such locomotive engines as will be first wanted, and for a portion of the carriages.

The Directors in referring to the Bills for railways, connected with the London and Birmingham, which have received the Royal Assent in the present Session, feel themselves called upon to congratulate the Proprietors on the great accession of traffic which they may anticipate from the direct communication opened with the northern and eastern parts of the kingdom, by means of the Midland Counties, North Midland, and Birmingham and Derby Railways, not to mention the connection between Birmingham and Gloucester, by the Birmingham and Gloucester Railway, nor minor lines, which will all contribute to swell the revenue of the Company. Acting upon the suggestion of the Proprietors at the last General Meeting, and considering it desirable that a connexion should be secured with Leamington and Warwick, the Directors have instructed the Company's engineer to ascertain the levels for a branch line to those places, to join the London and Birmingham Railway near Coventry; and they have also set on foot the usual investigation into the traffic, so as to be prepared to follow up the object with such measures as may, in the opinion of the Proprietors, be deemed expedient.

By the statement of accounts now to be laid before the Proprietors, it will appear that

	£	s.	d.
The receipts to the 30th June were	1,955,608	0	5
The disbursements	1,492,100	16	8
That the balance in favor of the Company was, at that date	463,507	3	9

And that the amount received on loan, pursuant to the powers given by the last General Meeting, was 443,800*l*.

It is estimated that the liabilities of the Company, for the next six months, will be sufficiently met by the cash at their disposal, and by loans which have been tendered and agreed for, with the addition of calls. Great as the present scale of expenditure will appear, the Directors are satisfied that so long as the works proceed with energy proportioned at that expense, the Proprietors will hail the increase as an additional evidence of the approach of their great undertaking to completion.

The iron railroad from Nuremberg to Furth appears to be successful. Between July 23d and August 19th, no fewer than 17,362 travellers passed along it.

AGRICULTURE, &c.

BONES AS MANURE.

Bones, although of comparatively late introduction as manure, have yet occupied so much of farming attention within these few years, that we have no hesitation in placing them at the head of those miscellaneous substances which are usually employed for that purpose. They have indeed been used in some parts of England for a long time, and have been extensively imported from the Continent into the town of Hull, where several machines have been erected either for grinding them into powder, or bruising them into small pieces; which modes of application have been found so advantageous, that they have, within the last twenty years, excited general attention, and are now in almost universal use as the principal manure for raising turnip crops on the calcareous soils in Yorkshire and Lincolnshire. It is upon this description of land that they are the most decidedly valuable, and the testimony of some farmers of experience, proves that to mix them with a portion of vegetable or coal ashes, is a profitable application for the production of turnips; as, by this method, the vegetation of the seed is quickened, and the young plant, getting rapidly into rough leaf, thus escapes the fly.

Long before the great advantage which may be derived from ground or well-crushed bones was generally known, many persons were aware of their fertilizing properties. To render them available, however, the wasteful and injurious process of reducing them into ashes by fire was then commonly resorted to; by which, indeed, a certain degree of benefit was imparted to land upon which sulphate of lime or gypsum will have effect, but could not be so effectual, in point of nourishment, as bone in an uncalcined state, because the oil and other nutritive matter which it contains is thus dissipated. In other instances, they were either reduced by lime, or laid at the bottom of the farm-yard, and decomposed by the effect of urine, and in some cases were partially broken by the hammer. In these modes, however, great quantities were wasted, which is now prevented by the improved method of preparing them by machinery: it is therefore useless to enter further into the details of practice which has become obsolete.

When reduced to powder, the bones alone are ground, being divested by the process of boiling, not only of every particle of flesh, but also of a material portion of oil which is also extracted; and it is only in that state that they can be brought to the condition of fine powder. In this state, it is only reasonable to suppose that they cannot be so beneficial to the land as when fresh and unboiled; yet we find, by the report of the Doncaster Association "on bone manure,"—to which we shall presently refer—that they have been found more effectual after having passed through the manufactories. When not ground completely into powder, they are, however, broken in the machines, by cast-iron roll-

ers, formed with deeply indented rims, by which they are first partially bruised, and then falling down upon other sets of rollers, each with the teeth more closely fixed they are in this manner reduced to various sizes, from one inch to half an inch in thickness, and a considerable quantity of coarse dust is also procured by the process. These bones are usually sold under the respective designations of inch, three-quarters inch, half-inch, or dust; but the greatest demand is for those of the half-inch size, which contain all the dust which has been formed in crushing them. The "dust" is collected in great measure by ridding the inch and three-quarters inch bones.

When the bones are not boiled, each pair of rollers is furnished with a set of malleable iron scrapers attached below, in order to clear the teeth of any animal matter which may adhere to them, and thus the oil substance contained in the bones is saved.* As bone-mills have been now very generally erected, there are few parts of the country where the manure cannot be procured in a prepared state; but when the bones are only to be had raw, and it is an object with the farmer to reduce them to a small size, they can be easily broken to pieces by his own laborers. Several farmers have indeed erected small machines with two cylinders of cast-iron, with teeth, which lock into each other, by which they are broken into small pieces. The price at the mills varies, of course, according to the trouble of preparation, the distance of carriage, for grinding, and the demand; but commonly average, for the dust, from 2s. 6d. to 3s., and in some late instances even 3s. 6d. have been paid—for pieces, from 2s. to 2s. 3d., according to size—and 1s. 10d. for rough bones, per imperial bushel. No allowance appears to be generally made by the dealers on those which have gone through the process of boiling.

The expense of bones purchased in the rough state, and broken on the farm, is thus stated as an actual charge incurred per acre—

24 cwt. bones, prime cost,	£2	3	2
Carriage of ditto, 7 miles,	0	7	0
6½ days, man breaking bones, at 1s. 10d.,	0	11	11
3½ do. a girl spreading do. on the drills,	0	2	11
	£3	5	0

EXPERIMENTS.

The effects will be best seen by the following trials:

On the estate of Garrowby, on the Yorkshire Wolds, belonging to Sir Francis Wood, the crops of turnips had dwindled to nothing, and the fallows, though tolerably manured, were covered only with common hemp, nettle and other weeds, instead of turnip plants; but by the use of twelve to

twenty bushels of bone dust in drills, the turnip crops have become excellent, and the following crops are very considerably improved.*

At Clumber Park, the seat of the Duke of Newcastle, in Nottinghamshire, 600 bushels of small bones were, in 1822, spread upon twenty-four acres of grass land, in the dairy farm, consisting of dry, sandy, and gravelly soil, which had been laid down about ten years. Their effect upon the pasture improved the condition of the cows so materially, that about twice the quantity of butter was made from them than from cows grazed upon land of similar quality, but not boned; and this effect, it is said, still continues.†

Twenty-five bushels of bruised bones, per Scotch acre, having been applied by Mr. Watson, of Keillor, near Cupar Angus, to Aberdeen yellow turnips, on some sharp black land, brought them above ground on the third day, and into rough leaf on the tenth; on the fifteenth, they were fit to be thinned out; while farm-yard manure, though applied to the same soil, at the rate of twenty-five cart-loads per acre, did not bring them up till the fifth day, nor render them fit for the hoe until the twentieth.—They in this manner manifested the same superiority until the month of September, when the weather having set in dry, it was expected that the crop would cease growing; which was the case with that part which had been dunged, but the bone turnips continued to grow vigorously, and upon a comparative trial in the middle of October, their produce exceeded those which were dunged, by six tons per acre: twenty-eight tons to twenty-two.‡

On some land, the quality of which is not stated, crushed bones were laid by Mr. Falla, of Gateshead, near Newcastle-upon-Tyne, at the rate of 100 bushels per acre; the rest of the field being manured with well-rotted stable-dung, at the rate of fifteen two-horse cart-loads per acre; that part which was boned was superior to some parts of the dunged ground, and fully equal to the rest.§

Mr. Graburn, of Barton, in Lincolnshire, has manured with crushed bones, at the rate of thirty bushels, and with dung at eight loads per acre, for turnips, after which the turnips were much later than the rest. On the second year of seeds, after the turnips, he covered the dunged part with yard manure a second time, and two years afterwards, a third time; then sowed the land with wheat, and the boned ground produced rather a better crop than that which had been thus thrice dunged.||

During the dry summer of 1826, thirty-four acres of a siliceous sandy soil, on the estate of Sir Charles Throckmorton, at Buckland, in Oxfordshire, half of which had been manured with farm-yard manure, and the remainder with bones. The whole

*Doncaster Report, p. 6.

†Ibid. p. 13.

‡Quart. Journ. of Agric. N. S., vol. i. p. 14.

§Farmer's Magazine, vol. xvi. p. 300.

||Lincoln. Report, p. 300.

*See the Prize Essays of the Highland Society, for a detailed description, accompanied with plates of a very complete mill for crushing bones, erected by Mr. Anderson of Dundee.—N. S., vol. i. p. 301. Ibid. p. 73.

was sown with turnips, drilled in the Northumberland fashion; and that portion on which the bones were laid presented a remarkably fine crop, nearly a fourth part advanced in bulb about the latter end of August, while that part which had been dunged was merely getting into leaf.—The experiment was repeated in 1827, on green-globe turnip, sown on the 20th of July, upon similar lands, with the same superiority in favor of the bones; the succeeding crop of barley also produced five bushels per acre more than that which followed the dunged turnips, and the cover was also heavier.*

The Honorable Captain Ogilvie, of Airlie Castle, has also applied bone dust, at the rate of 15 and 20 bushels per acre, to a light sandy loam, with a subsoil of gravel and sand, coming in some places nearly to the surface; and after the experience of five years upon a series of trials commenced in 1827, he found all the successive crops of turnips, barley, and grass-seeds so decidedly superior to those which had been previously produced by other manure, that the Highland Society last year awarded their honorary silver medal to his Report.

To these facts in favor of bone manure, others must, however, be also stated of an opposite tendency, particularly when placed in opposition to farm-yard manure, to which we wish to call especial attention in comparison with bones, as being at the command of every farmer.

On the estate of Mr. Evans, jun., of Dean House, also in the county of Oxford, bones were tried for the wheat crop upon calcareous stony land, in comparison with stable-yard manure; but the dung had so greatly the advantage, that the bone crop appeared but little if any degree better than that on soil without any manure whatever.†

On the lands of Mr. Hawden, in Kincardineshire, turnips were sown in the month of June, on various soils, in drills laid off at 27 inches apart: the manure was laid on in single Scotch acres; and the produce of the roots, exclusive of tops, accurately weighed, as follows:—

On a mixture of stiff clay and gravel,	
12 tons of farm-yard manure produced 26 tons 8 cwt.	
14 " " bone-dust, " 23 " 12 "	
On a soft sandy soil, naturally inclined to moor,	
16 tons of farm-yard manure, produced 29 tons 12 cwt.	
14 " " bone-dust, " 24 " 16 "	
On sandy light soil, sown the following year,	
16 tons of farm-yard manure, produced 25 tons 16 cwt.	
11 " " bone-dust, " 23 " 18 "	
10 cwt. horn-shavings, mixed)	
with one cart-load of hen-)	
dung and 9 ditto coal-ashes,)	20 " 6 "

It is also remarkable, that although three of the drills were spread unmixed with the horn-shavings, which are considered as a more powerful manure than bone, yet they only produced at the rate of 2 tons 13 cwt. per acre †.

*Prize Essays of the Highland Society, N. S., vol. i. p. 75, communicated by Mr. G. Sinclair.

†Ibid. p. 77, communicated by Mr. G. Sinclair.

‡Prize Essays of the Highland Society, N. S., vol. i. p. 69.

On Mr. Boswell's farm of Kingcausie, in Kincardineshire, two acres of Norfolk globe turnips were drilled upon poor high ground, reclaimed from moor, and

30 cart-loads, or tons, of dung produced 32 tons 14 cwt.
14 ton of bones " 23 " 13 "

On the same farm, in another year, the season of 1824 being cold and wet operated very much against the turnips which were manured with bones; but in that of 1822, those raised with bones and stable-dung, appeared to be equal.*

Notwithstanding this evident difference against the produce obtained by bones, in point of weight it should not, however, escape remark, that the latter gentleman estimates the value of their return in money as being superior; for the cost of the two manures is, according to his calculation, as follows:—

One acre manured with farm-yard dung—	
20 cart-loads of dung, including carriage, at 10s. per load,	£10 0
33 tons of turnips, at 10s. per ton,	16 10
Nett return,	£6 10
One acre manured with bone—	
14 ton of bones, at 42s.	£12 6
Breaking and driving ditto,	0 18 0
29 tons of turnips, at 10s. per ton,	3 10 6
Nett return,	14 10 0
	£10 19 6

Thus leaving a difference in favor of bones of no less than £4. 9s. 6d.—or what we should in this country call a tolerably fair value, if fed off, for the produce of an imperial acre: but although the price of the turnips is far beyond present rates, and the charge of dung, unless carried to a great distance, is too high, we yet leave the account as it stands, as forming a ground for similar comparative calculations.

To this may be added the following particulars of a comparative trial between stable-manure and crushed bones, lately made on the property of Sir William Maxwell, of Calderwood. The field was an old ley, consisting of strong loam, on a retentive clay bottom; but having been completely drained, as well as ploughed and cleared, under favorable circumstances, the condition of the land—from which the previous crop of oats had been taken in 1832—was perfectly satisfactory at the time of preparing it for turnips, with various species of which it was sown in the following spring; and in addition to the quantities of manure stated at foot, 7½ chaldrons of lime were laid per Scotch acre. Where the stable-manure had been applied, the plants sprouted more rapidly and vigorously than was the case with the bones; but ultimately the latter gained ground, and, if anything, got rather the start of the dung, and no part of the crop suffered in any degree from the fly. The most accurate calculations were made in order to ascertain the produce of the crops per acre, and the following was the result:

Swedish,	
30 cart-loads of stable-dung per Scotch acre, produced	29 tons.
60 bushels of crushed bones	" 24
Dale's Hybrid,	
30 cart-loads of stable-dung	" 33

*Prize Essay of the Highland Society, N. S., vol. ii. p. 206.

16 bushels of crushed bones,	" 31
45 " ditto,	" 29
Yellow Bullock,	
30 cart-loads of stable-dung	" 29
60 bushels of crushed bones,	" 23

The quality of the soil is, however, by no means particularly well adapted for the turnip culture, partaking, as it does, rather too much of the clayey character; and although it was divested by drainage of all superfluous moisture, yet there can be little doubt that to that cause the comparatively unfavorable effect of the bones may be chiefly attributed.*

EFFECTS OF BONE-DUST AND BONES.

Bone-dust is the fittest state in which to lay it upon grass, for it will not only take more immediate effect upon the crop, but if laid in pieces, it would interrupt the progress of the scythe. It should, however, be recollected, that fine powder can only be obtained from spent bone which has undergone the process of manufacture. It is, therefore spread as a top-dressing, by hand; but it is also very commonly laid in the drills for turnips, for which purpose many ingenious machines have been contrived for sowing it along with the seed.† It is, however, much to be regretted that these implements cannot be constructed with more simplicity, for their cost is so considerable, that unless a man has a very large quantity of land to drill, their purchase would be imprudent, and the hire is generally unreasonably expensive.

Regarding the *quantity of dust*, the powdered bones are dearer than those which are merely broken small, and although said to be more forcing to the first crop, on account of their being, when in the state of powder, more intimately blended with the soil, and more directly applied to the seed, yet they are not found so durable as when they are laid on in pieces: but it is also true that, in the former case, they are not laid on so largely, for the amount depends entirely on the size of the bones. They have been applied in the rough state, to the extent of 100 bushels per acre; but the average quantity, of all sizes, is stated, in the Doncaster Report, to be 39 bushels.—When the smaller bones are distinguished from the larger, they, however, seldom appear to exceed 30 bushels per acre, and in many cases do not arrive at 20: perhaps it may be assumed, as the most general practice, that half-inch bones are employed at the rate of 25 to 30, and dust at 20 bushels per acre; but a distinction should also be drawn between the quantity of those which are applied after being manufactured, and those which are laid on in a raw state.

The size of the pieces to which the bones should be broken is also an object of some

*Quart. Jour. of Agric., N. S., vol. iv. p. 839.

†A very detailed description of one of these instruments, along with an engraving, may be found in the Quarterly Journal of Agriculture, N. S., vol. ii. p. 719.—Another machine for the same purpose, but with a double hopper, for sowing two drills at one time, is also described, together with a plate, in the Prize Essays of the Highland Society of Scotland: N. S., vol. iii. p. 206.

importance, as the smaller they are the more prompt will be their effect: on which, the following observation has been made by one of the correspondents of the Doncaster Association: "That if he meant to till for early profit, and if he wished to keep his land for good heart, he would use half-inch bones; and in breaking these, he should prefer some remaining considerably larger." the reason assigned for which is, "that by using bones of a large size, with dust in them, there must be sufficient of the small particles of the dust to set the turnip crop forward, and sufficient of the large particles of the bone left to maintain the land in good condition for the last crop."

Respecting their durability, it has been affirmed, that the effect will not be increased if they be laid on to great amount; for the same produce has been obtained from the comparative application of 50 and 100 bushels; and an experiment has been tried by varying the quantity on different ridges of a large extent of ground under turnips, at the rate of 28, 40, and larger quantities alternately, without creating any visible difference in the crop.* This, however, may be perfectly correct, so far as regards one or two crops, for it has been found that, when used in large quantities, they have rendered the land extraordinarily productive during a great length of time, of which we find the following instances in the Doncaster Report:

1. On a field, part of which was boned forty years ago, the crops were, on that part, during fifteen or sixteen succeeding years, visibly better than the remainder, although the land was all of the same quality, and the part not boned was manured with farm-yard dung.

2. In another case, about three acres of light, sandy land were dressed, in 1814, with 150 bushels of bones per acre; since which time the land is said to have never forgotten it, but is nearly as good again as the other part, farmed precisely in the same way, with the exception of the one application of bones.†

We learn, also, from experiments at Kew, that although they yield a certain supply of nourishment to plants, the moment they are capable of receiving it, yet that is done so gradually as to furnish only a regu-

*Quart. Jour. of Agric., N. S., vol. ii. p. 103.

†About six years ago, a farmer is also said to have obtained a forty-years' lease of a tract of poor land, in a high situation near Rochdale, in Lancashire, on which, after fencing and draining it, he erected a bone mill, and began manuring the ground at the rate of 100 to 130 bushels of bones and dust per acre. The consequence of which was, that in a few years he let off more land than paid the rent of the whole, and retained a large farm in his own hand. The Correspondent of the Quarterly Journal of Agriculture, from whom these details are taken, says "that one acre would summer a cow of large size, and that some fields were cropped with oats ten or fifteen years in succession; yet that it is surprising to see the herbage which the land still produces, both as to quantity and quality, near one half being white and marl clover.

lar and moderate supply: reasoning upon which, it is to be presumed, that as a large quantity does not produce the effect of forcing a crop in proportion to the amount supplied, neither can it be so soon exhausted by the gradual consumption of the smaller quantity. This application may therefore be perfectly consistent with good husbandry, if applied to any amount, however large; though, as regards the farmer's purse, the expenditure of the outlay is a different question. The extent of their fertilizing quality is greater upon grass-land, under cattle, than upon arable. Valuers estimate the allowance to a quitting tenant by supposing the effect of bones upon tillage and meadow-ground to be exhausted within four years; but on grass-land depastured it is considered to last during eight.*

Experience seems to be in favor of laying the manure in drills, especially when applied to turnips, although the superiority of the broad-cast practice is maintained by some very intelligent farmers, who hold—that the turnip plant receives its support principally from the fibres which it throws out sideways, to a much greater length than people will believe, and derives more nourishment from them than the tap-root; and that the bones being dispersed, the fibres are more likely to meet with them than when they are accumulated round a tap-root, and that method must be the best which occasions the greater quantity of nourishment to be conveyed to the body of the turnip. In drilling the bones, there is also a difficulty found in the after-ploughing, of mixing them with the soil; and although this may be in some measure obviated by cross-ploughing the ridges, yet that portion of the land on which the manure is thus laid receives more than an equal degree of benefit. A third mode is however acted upon by others, who sow them broad-cast, and gather them into ridges with a mould-plough.

The time for laying them upon the land, when applied to grass, whether natural or artificial, is generally recommended to be early in the spring; but if upon meadow, the growth of which has been fed off, then the moment the cattle are removed. Experience, however, varies upon this point; because it has been found to depend materially upon the season and the state of the land, which, if wet, will be more benefitted by delaying the operation until the weather becomes warm and the ground dry.

When applied in the drills of arable land, they are of course deposited along the seed; but when spread broad-cast, then they are not uncommonly either harrowed in immediately previous to the sowing, or with the last ploughing; though, when used in a fresh state, without having been subjected to process of manufacture, they should always be laid in sufficiently long before the sowing, to allow them time to ferment, or they will not take immediate effect upon the rising crop.†

* Report of the Committee of the Doncaster Agricultural Association, on bone-manure, p. 14.

† Doncaster Report, p. 16.

The soils to which they are best adapted are those of a light and warm nature; for on wet and cold grounds they have rarely been found to produce any sensible benefit. Their power of contributing to lighten strong land, by their mechanical action upon the soil, and thus rendering it less adhesive, has indeed been vaunted, and, if laid on a very large amount, there can be no doubt that the bones, in pieces, would have some such effect; but the smallness of the quantity in which they are usually applied renders their force for that purpose quite insignificant.

On heavy loams and clays, the accounts of their operation have been almost invariably unfavorable; and it may be laid down as a necessary qualification in a soil fit for the application of bones, that it should be dry. This, indeed, has been contradicted by experiments stated in the Doncaster Report, upon what is described as a wet sand soil, with an irony-colored sub-soil, upon which two quarters per acre were drilled, and produced an excellent crop, when manure had been previously tried without effect. This, however, having occurred in the years 1826 and 1827, which were unusually dry, may serve to explain the fact, without affecting the principle that bone manure is not geneally beneficial to clay lands.

The same Report states, "upon very thin sandy land, the value of bone-manure is not to be estimated; it is not only found to benefit the particular crop to which it is applied, but extends through the whole course of crops; and even in the succeeding courses, its effects are visible in the improved quality of the land, and the efficiency of a smaller quantity than would at first have insured a crop. Upon much of the high land about Babworth, which is a light sandy soil, the crops under ordinary farm management were comparatively unproductive; but since the introduction of bones, after having been dressed for several fallows with sixty or seventy bushels per acre, they have not only become productive, but so much improved in quality as to return an equal crop with a much lighter dressing of manure or bones throughout the next course."

"On the dry limestone near Doncaster, the same favorable results have been obtained; and no failures, beyond those attributable to peculiarity of season, are noticed."

On the Wolds of Yorkshire and Lincolnshire, it also appears, by the testimony of several extensive farmers, that "before bones were generally used with turnip-seed, many thousand acres were annually sown for that crop without any manure whatever, from the impossibility of getting fold-manure for more than one-third or fourth of their fallows. The turnips upon such unmanured land were consequently very indifferent; and the benefit of sheep feeding upon their tops—for of bottoms they seldom had any—was very trifling. Since the use of bones has, however, become general, the turnip crop has been, in many instances, ten-fold, and in few less than four or five-fold its former bulk. All the suc-

ceeding crops of grain and seeds have been amazingly increased, and, upon the four or five-shift system, there is no doubt the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power."

On *light loams*, the return on the Doncaster Committee give bones a preference to farm-yard dung. And we learn that, upon the calcareous soil of the Yorkshire Wolds, heavy crops of turnips have been raised from 16 bushels per acre of bones, while in the same field, and under similar circumstances, but manured from the farm-yard at the rate of from 8 to 10 tons per acre, the turnips have been of the most inferior description.

On *peat soils*, if previously drained and laid dry, their advantages are reported to be so striking, that from fifteen to twenty bushels of dust per acre, drilled, have been also found to very far surpass the ordinary dressing of stable-dung, and even of lime and pigeons' dung.

On *gravels*, the reports are meagre and contradictory, though perhaps reconcilable in principle. as it has been justly observed, that "a gravelly soil may embrace every variety of texture and quality, from the light dry sand to the water-logged yellow clay—preserving in each the necessary admixture of stones and grit." To wet gravel, their application has been found decidedly unfavorable.*

ANALYSIS.

An examination of the component parts of soils, and of the power of bones, when applied to them as manure, would go far to explain the irregularity of their different effects upon various kinds of soil. Bone is known to consist of about equal parts of earthy and animal matter; the former chiefly composed of gypsum—which is of so indestructible a nature as to have been termed, by early chemists, the "earth of bones"—and a small portion of carbonate of lime; from which we may conclude that probably half the weight of bones is in the greater part consumed by plants as direct nourishment in their state of growth, and that the remainder is more gradually absorbed by the soil, as well also as by the plants; for lime, though in small amount, is always present, in greater or less quantity, in all vegetable substances.

"The quantity of earthy matter varies according to the age of the animal; and, in like manner, the quantity of animal matter varies also in proportion to the condition of the animal. In the best kinds of bones for manure, viz., those from fat young animals, perhaps the following proportions may give an approximation to the relative quantities of each in 100 parts:—

Earthy and saline matter,	40
Cartilage and jelly,	40
Fatty matter,	20
} parts.	

The soft parts thus form, in the best bone, about sixty, and upon an average, perhaps, amount to fifty per cent., which are almost entirely constituted of the same elements of plants, and all of them, sooner or later, liable to be dissolved and absorbed

by the roots. The cartilage, indeed, when the bones have been buried in a dry situation, is very indestructible; but when exposed to the action of air, water, soil, and vegetation, probably pass into the state of jelly, and be dissolved, or otherwise decomposed, probably at the time when the fatty matter—the decomposition of which begins almost immediately—shall have been nearly exhausted."*

This analysis has been taken from an anonymous essay "on the action of ground bones on plants and soils;" the author of which observes, that "although it be granted that the composition of bones is thus well calculated to afford nourishment to plants, it must be admitted that the amount of their action as a manure still remains in a great measure unexplained. The quantity allowed per acre is not usually more than 10 or 15 cwt., of which not more than a half is efficient as manure; and this is but a small fraction of the weight which we carry off the field in vegetable produce. In these circumstances, we must either leave the matter unresolved, or have recourse to hypothetical explanation, to be confirmed or disproved by future observation." We agree with him in preferring the latter alternative, as best calculated to lead to a discovery of the truth; and as an inquiry into the cause of the different results occasioned by the specific application of bones to every species of soil would only lead us into a wide and probably fruitless discussion, we shall confine ourselves to an account of the analysis given by Mr. G. Sinclair, of the two kinds on which trials are mentioned by him to have been made in Oxfordshire.

That on the land of Sir Charles Throckmorton, on which the bone manure had such beneficial effects, contained in 400 parts:—

Fine siliceous sand, 167 parts.	calcareous sand,	309
43; water of absorption, 99,		
Decomposing animal and vegetable matter, de-		
structible by fire,		24
Carbonate of lime (impalpable,)		25
Silica, or the pure earth of flints,		23
Alumina, or the pure matter of clay,		9
Oxide of iron,		3
Soluble animal and vegetable matter prin-		
cipally vegetable extract, with indications of		5
marinate of soda,		
Moisture and loss,		2
		400

That on the land of Mr. Evans, jun., on which the bone manure appeared to have no beneficial effect, consisted of:—

Calcareous sand and gravel, nearly pure car-		
bonate of lime,		217
Decomposing animal and vegetable matters, de-		
structible by fire,		17
Carbonate of lime (impalpable,)		39
Silica,		85
Alumina,		20
Oxide of iron,		5
Soluble matter, principally vegetable extract,		
with sulphate of lime, or gypsum,		4
Moisture, or loss,		13
		400

On which he remarks, that "the striking and essential point of difference between these two soils consists in the carbonate of lime. In the soil so much benefitted by the bone manure, carbonate of lime is defi-

cient, while in the soil so little benefitted by it, the carbonate of lime is almost in excess; at least, had it not been so much in the form of gravel and sand, the soil would have been what is termed cold. The differences, also, between these two soils, in the coarseness and fineness of their sand and gravel, and the superior quantity of alumina, or clay, in calcareous soil, should not be overlooked."

The quantity applied to the siliceous sandy soil, where the bones had such beneficial effects, was 36 bushels per acre, partly supplied from the dog-kennel, and partly purchased. On the calcareous soils, they were applied in a large quantity, and also in a recent state; on which Mr. S. observes, that "animal matter being so much more easily decomposed than vegetable matter, the recent bones must afford nutriment to the soil very speedily;" yet he adds, "that he has always found that both animal and vegetable matter, before they become beneficial to an immediate crop, require a first stage of decomposition, and that this degree of fermentation or decomposition is best effected before these substances are applied to the land."

This accords with the Report of the Doncaster Association, in which it is said "to be acknowledged by their correspondents to be a prevalent opinion among intelligent farmers, that manufactured bones are equal in their effect to raw bones;" in proof of which they instance the following experiments:—

Twenty-four acres having been boned at the rate of 50 bushels per acre, part with bones which had the oil stewed out of them, another part with bones which were full of marrow, and a third part with horses' bones having much flesh upon them. The crop, which was turnips, was all good, but the next crop, where the fleshy bones were laid, was not so good.

Broken bones fresh from dog-kennels were spread on a newly-ploughed clover ley of high sand land, at the rate of 80 bushels per acre, and on the following day sown and harrowed in with wheat; but the crop was bad, and no advantage was observed to be derived from the bones in the succeeding crops. The same experiment was repeated upon a piece of fallow in Blyth Forest, sown with turnips, with similar results; but the same gentleman having sent bones from the dog-kennels to be broken, and then laid upon a heap, and covered with earth, in which state they remained for about a month, after which they were laid upon turnips: their good effects were visible on every yard on which they spread, being the largest and the best turnips in the field, although the other part was manured from the farm-yard, where a considerable quantity of oil-cake had been consumed.

These experiments certainly tend to confirm the fact, that fermentation is requisite to give immediate effect to bones as manure, which is only in accordance with the chemical principles applicable to all animal substances; for we all know, that although flesh, if buried in the earth, will not produce any benefit to the land until it is decom-

*Doncaster Report, p. 8.

*Quart. Jour. of Agric., N. S., vol. i. p. 49.

posed, yet that object once attained, its fertilizing powers are instantly brought into force; but we cannot admit that this warrants the conclusion, "that manufactured bones are equal in their effect to raw bones." They may indeed be superior on a first application; and we make no doubt that when thrown together and rendered putrid, they will become more promptly available than if they had undergone no fermentation whatever. Yet we feel persuaded, both from the nature of animal matter as manure, as well as from much inquiry regarding the practical application of bones, that when deprived by manufacture of the gelatin and oil which they contain, their improvement of the land will not be so durable as when they are laid on raw, or after fermentation when collected in a fresh state.* Many farmers are thus imposed upon by dealers; but the bones are sold to those who are aware of their real value, for much less than the price of those from which the oily substance has been extracted.

COMPOSTS.

The fermentation of bones naturally leads to the consideration of the subject of forming a compost of bones with earth and other substances, by a mixture with which they soon become decayed and pulverized—a practice which is stated in the Doncaster Report to have been recommended by several very intelligent farmers, thirteen of whom, solely from the result of their own experience, describe its effects as superior to those of bones used singly. With some of these, it is the practice to mix 50 bushels of bones with 5 loads of burnt clay, or good earth, per acre; by which dressing, the crops between fallow and fallow, excepting clover, appear to have been increased one-fifth in value. Others use forty bushels of bones, broken from two to three inches, in a compost with five loads of farm-yard manure, and a sufficient quantity of earth, the effect of which has been felt on the wheat crop at the end of the four-course system. Many also mix up dung, root, rape dust, and the ashes from weeds and house fires, with the bones, by which great heat, and consequent fermentation, is occasioned.

The most general practice, however, is to form the compost entirely of bones and yard muck, mixed, in various proportions, with

From 50 bushels of bones to 4 or 5 of dung.

20	do.	4	do.
12	do.	8	do.

This, if the heap be well covered, will no doubt decompose the bones very rapidly; and one person states, "that he has used as much as 35 bushels of bone dust, per acre, without manure, in the same field where he laid six loads of fold manure, and

*Besides the various modes already in use of drawing oil and spirits from bones and horn, the cotton manufactures in Lancashire are said to have lately used a glutinous substance, extruded from bones, in the fabrication of the web of their low-priced cloth; and there are now a number of manufactories of this newly-discovered matter.

ten bushels of bone dust; but the turnips on the part manured with bone dust alone were not so good as those on the part manured with the compost and the succeeding crops were still worse in comparison."

As the great amount of bones now actually consumed as manure, besides the quantities applied to other purposes, may reasonably excite an apprehension that the still increasing demand will soon exceed the supply and consequently raise the price, a correspondent of the "Quarterly Journal of Agriculture,"* has suggested the following economical method of employing them, which he has used for the two last years, and by which he states that he has obtained heavy crops of turnips.

He forms a compost, as the manure for one imperial acre, of 8 bushels of coarse bone-dust, with no less than double that quantity of coal-ashes, which may be generally procured for about 5s. per ton. The ashes should be carefully collected in dry weather and placed under cover, in order that they may be kept free of moisture, or, if that be difficult, they may be strewed with a dusting of quick-lime; after which they are to be riddled as small as the dust itself, for otherwise, if sown with a drilling-machine, they will not pass easily through the hopper. The bones are then mixed with the ashes; the mass ferments, and evolves a considerable degree of heat, when they soon become fit for use.

Turnips raised with this compost, he affirms to have always possessed the same characters of a close crop, from root, and hardness to resist the rigors of winter, that turnips raised with bone-dust alone evince; in proof of which, he has sold them for 7 per acre, to be eaten off by sheep. He however, supposes that it is the bone-dust alone which secures to the crop whatever nourishment may be imparted to it at the future stages of its growth, in which he is doubtless correct; but in imagining that he has thus discovered a more economical mode of their application in their effect upon succeeding crops, we imagine that his further experience will show him that he has been deceived; for although the fermentation of the bones, occasioned by the application of the ashes, may increase their power upon the actual crop, it will be proportionably diminished in those which follow, and we think that the instances which we have already stated must convince practical men that the durability of their influence upon the soil depends on the quantity in which they are applied.

APPLICATION.

Independently of the decided fertilizing properties of bones, when applied to dry and light soils, they have the great advantage of being procurable at a small expense of carriage, which diminishes the labor of teams to a great extent; for one wagon-load of 100 bushels, broken small, will in most cases be found equal to 40 cart-loads of yard manure. They are also capable of being preserved during a long time, when farm business is not pressing; added to which, they leave the land freer from weeds

than when it is manured with dung. This and their suitability to the drill husbandry, renders them peculiarly adapted to the cultivation of turnips—to which, indeed, they have been the most universally applied; and we need not remind our readers, that on the success of that crop generally depends those of the whole succeeding course.—The instances are also numerous, upon all soils, of turnips being destroyed by the fly when sown in drills, having had the manure placed directly under them; when turnips sown in the same field, and on the same day, with bone-dust, have entirely escaped their ravages. Their value to the holders of light soils, in thus enabling them to procure the certain means of improving the returns from their land, by this increase of their quantity of nutritive manure, may therefore be considered inappreciable. It has been stated as the comparative result of some experiments, that bone-dust acts in the cultivation of grain, as compared to the best stable manure, in the following proportions:—namely,

In respect to the quality of the corn,	as	7 to 5
In respect to the quantity, as		5 to 4
In respect to the durability of its effects on the soil, as		3 to 2*

We cannot indeed agree altogether in this estimate of its powers, but it requires no further arguments to press its application upon the attention of every farmer, who is in possession of ground to which it is suitable. We shall, therefore, only add the following summary of the rules for its application, as recommended by the members of the Doncaster Agricultural Association, from which it appears—

That on dry sands, limestone, chalk, light loams, and peat, bones are a very highly valuable manure.

That they may be applied to grass with great good effect.

That on arable lands, they may be laid on fallow for turnips, or used for any of the subsequent crops.

That the best method of using them, when broad-cast, is previously to mix them up in a compost with earth, dung, or other manures, and let them lie to ferment.

That if used alone, they may either be drilled with the seed, or sown broad-cast.

That bones which have undergone the process of fermentation are decidedly superior, (in their immediate effects) to those which have not done so.

That the quantity should be about twenty bushels of dust, or forty bushels of large, increasing the quantity if the land be impoverished; and, also, according to our opinion, if the bones have been already manufactured.

That upon clays and heavy loams, it does not yet appear that bones will answer.

On this latter observation, however, a farmer near Nantwich, Cheshire, remarks, that he "occupies a farm in the township of Pickmore, the soil of which is a clay loam, scarcely twelve inches deep, the sub-soil a grey sand, mixed with coarse clay—which the farmers call *rammel*—on a bed of

good clay marl. Two years ago, he covered the field with bone-manure; previous to which the grass was so sour, as not to be worth ten shillings per acre; but is now full of most excellent herbage, consisting of white clover and trefoil; to which he adds, that "in another of his fields, with a clay soil, a small portion of it was manured, thirty-two years ago, by a former tenant, with bones, and that, although it has been twenty years in tillage, yet that part still shows a superiority over the rest."*

From the Genesee Farmer.

DURABILITY OF WOOD.

The subject of the durability of different kinds of wood when exposed to the action of air and moisture, though one of great importance to the farmer, and the public at large, does not seem to have received that degree of attention and elucidation it deserves. The Teak tree (*Tectona grandis*) of the East Indies, and the Live Oak (*Quercus virens*) of our southern forests, appear to be nearly indistructable when employed as timber, and in naval architecture. But these from their natures cannot be cultivated in the northern States, and we must seek in our forests trees which shall approach or rival the above in excellence and durability. Fortunately these qualities are found nearly in perfection in the Yellow Locust, (*Robinia pseudacacia*), and the Red Cedar, (*Juniperus virginiana*), and in a lesser degree in many others, a knowledge of the comparative durability of which, properly ascertained, would be of essential service to the public.

Thirty-two years since, in enclosing some newly cleared field, we had occasion to set some bar posts, and at a point where four fields cornered we placed one so that it served for four pair of bars, one to each field. The post was the common white cedar, (*Cupressus thuyoides*), cut from a thrifty tree fourteen inches in diameter, the holes on the four sides cut in the usual manner with a narrow axe, the bark stripped from the whole, and the large end set two feet in the earth, which at that place was rather moist. After standing more than twenty years, or until the basswood fences with which it was connected had rotted down, it was removed to another position, where it has since served for two pair of bars and one gate. At the time of removal it appeared quite sound, and present appearances indicate a duration of another twenty years at least. From our experiments we are convinced that large posts are far more durable than small ones, and that those which occupy the whole diameter of the tree, are better than sawed or quartered trees of equal size.

In the Railroad Journal, in an article on the advantages of lime as a preservation of timber, the following instance of its effect on the durability of the White Pine, (*Pinus abies*), is given. The planks were a parcel of pine planks used as a platform on the ground, on which to make live mortar.—

*New Farmer's Magazine, No. 82, December, 1833.

This platform was laid by the informant's grandfather in a corner of the yard, and used every year more or less for the purpose of a mortar bed. His father continued it in the same use; himself, the grandson, continued it for a time, as long as he had occasion, after which it lay some years unused, and overgrown with grass and weeds. At length wanting the ground for another purpose, he had it torn up and removed, expecting to find the planks entirely rotted, but to his surprise found them sound, and, to use his own forcible expression, "as hard as a bull's horn." This was after they had lain exposed to all the vicissitudes of the atmosphere, and in contact with the surface of the earth, about sixty years.

In the year 1800, a Mr. Atkinson, in the employ of the Hudson's Bay Fur Company, discovered on old Factory Island, in James's Bay, a Branch of the Hudson's Bay, a cedar post, about a foot square and five feet high, on which the following inscription had been cut, and all the letters of which were distinctly visible: "In the year 1692 wintered three ships at this Island, with one hundred and twenty-seven men, under the government of Captain Ganes Knight. Then we erected this monument in remembrance of it."

This furnishes the greatest instance of duration of timber set in the earth, and constantly exposed to atmospheric influences, we have any where noticed, and we believe there are few kinds of timber which would endure so long. This notice does not state the kind of cedar employed, but from its frequency on those islands and coasts, there can be no doubt of its being the red cedar, a kind which, as stated above, is almost imperishable.

Next to the kinds above stated, rank in durability the various kinds of pine and spruce; the white oak, chestnut, red elm, black walnut, and red beach; all furnishing timber of good quality, but not such as will, like the above, resist for a long period the attacks of time. In purchasing timber, price should not be so much regarded as quality and durability, as a rail or a post that will last fifty or sixty years, is worth far more than the usual difference charged between such, and those which will endure only twenty-five or thirty.

MANUFACTURE OF BEET-ROOT SUGAR IN RUSSIA.

SIR,—The manufacture of beet-root into sugar in the Russian empire has of late become very extensive; there are already no less than twenty-five large establishments for this purpose in different parts. Thinking that the following account of one of the principal of these establishments, viz. Michailofsky Sugar-works in the government of Tula, the property of Count Bobrinsky, may be interesting to the English public, I send it for insertion in your widely circulated Journal:—

The quantity of beet worked in the year 1835 was 260,000 poods—to 85,357 cwt. 0 qr. 16 lbs.; the sugar produced from it, 15,600 poods=5014 cwt. 1 qr. 4 lbs.

Price of a pood of beet	15 copecks.
Expense in working do.	35 do.
	50

Produce of one pood of beet 2½ lbs., of raw sugar at 1 ro. 10 co. per lb.

The number of men employed 250.
The quantity of land required to produce the beet 350 deciatines=945 acres.

The beet is generally taken from the peasantry instead of the obrok or fine they, as serfs, would have to pay their baron.

The proprietor of this manufactory is an accomplished and amiable nobleman; his experiment in this case has been highly successful.

One great evil is the impossibility hitherto experienced of keeping the roots any length of time, which makes it expedient they should be worked as soon as possible after they are taken from the ground.

I have been favored with a specimen of raw and refined sugar from these works, of which I send you a small sample, and am only sorry the distance does not allow me to send a larger one.

The Russian lb. is equal to 14½ oz. English; a pood 40 lbs. Russia=36 lbs. English; a rouble=100 copecks; sterling value 10½d.

Your constant reader,

J. K.

PETERSBURG, June, 25, 1836.

[The samples sent are excellent; the raw sugar not quite so good as that from the cane, but the refined equal to the best products of our refineries—Ed. M. M.]

WESTERN RAILROAD.

PROPOSALS will be received at the Office of the Western Railroad Corporation, in Worcester, until the 20th November, for the grading and masonry of the first division of the Road, extending from Worcester to East Brookfield, a distance of 19½ miles. Plans, profiles, etc., will be ready for examination after the 10th November.

W. H. SWIFT,

Resident Engineer.

Worcester, Mass. Oct. 19, 1836. 43—nov20

TO RAILROAD CONTRACTORS.

PROPOSALS will be received until the 8th day of December next, for the graduation and masonry of the first ten miles of the Gainesville and Narkeeta Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Gainesville, for ten days previous to the time of letting and all other information given, on application to the subscriber or to the Assistant Engineer. Recommendations will be expected in all cases, of persons not known to the officers of the company or to the Engineer.

For the information of persons at a distance, it may be remarked, that this road commences at the town of Gainesville, on the Tombeckby river, and extends twenty-two miles south-west to Narkeeta in the State of Mississippi. The Tombeckby is navigable for Steamboats the greater portion of the year and having a direct communication with Mobile and New-Orleans, will afford facilities for procuring the supplies necessary for the hands employed on the work, or for their ready conveyance hither, if procured from a distance. The country through which the road is located, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season renders the contract peculiarly desirable to those wanting winter employment. To an enterprising and energetic contractor the construction of this road offers the prospect of a profitable job.

D. H. BINGHAM, C. E.

Gainesville, Ala. Sept. 21, 1836. 42—Dec1

NOTICE TO CONTRACTORS.

WASHINGTON AND RALEIGH RAILROAD.

PROPOSALS will be received at the office of this Company in Wilmington (N.C.) until the 15th of November for the graduation and bridging of 50 miles of the above Railroad, commencing at the north-east branch of the Cape Fear river, ten miles from Wilmington.

Any information which may be desired, can be obtained of Mr. T. H. Williamson, who will at all times be found on the line, or from the subscriber at Wilmington.

Contractors unknown to the undersigned must accompany these proposals with recommendations.

WALTER GWYNN.

October 15, 1836. 42—31

FRAME BRIDGES.

The subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz:

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitmore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabrid Dodge, Esq.,	(Civil Engineer,) Ohio.
Boaz M. Atherton, Esq.,	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Louisiana.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine. Across the Genesee river, at Mount Morris, New-York, and several other bridges are now in progress. The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H. Long.

Rochester, May 22d, 1836.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is no equalled in the United States. 9—ly

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—yt

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlem Railroad now in operation. J25tl

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast-steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—yt

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Brav's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechartown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No. 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is \$500,000 with liberty to increase to \$800,000, divided into shares of \$100 each.

The sum of \$5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I. BLAIR,
JOSEPH E. EDSALL,

COMMISSIONERS
41—9t

Dated Oct. 3rd, 1836

PATENT RAILROAD, SHIP AND BOAT SPIKES.

The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

* All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

* Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durfee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without specie, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitted joints,

	lbs.
350 tons 2½ by 4, 15 ft in length, weighing 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 8½, 9, 9½, 10, 10½, 11, 11½, 12, 12½, 13, 13½, 14, 14½, 15, 15½, 16, 16½, 17, 17½, 18, 18½, 19, 19½, 20, 20½, 21, 21½, 22, 22½, 23, 23½, 24, 24½, 25, 25½, 26, 26½, 27, 27½, 28, 28½, 29, 29½, 30, 30½, 31, 31½, 32, 32½, 33, 33½, 34, 34½, 35, 35½, 36, 36½, 37, 37½, 38, 38½, 39, 39½, 40, 40½, 41, 41½, 42, 42½, 43, 43½, 44, 44½, 45, 45½, 46, 46½, 47, 47½, 48, 48½, 49, 49½, 50, 50½, 51, 51½, 52, 52½, 53, 53½, 54, 54½, 55, 55½, 56, 56½, 57, 57½, 58, 58½, 59, 59½, 60, 60½, 61, 61½, 62, 62½, 63, 63½, 64, 64½, 65, 65½, 66, 66½, 67, 67½, 68, 68½, 69, 69½, 70, 70½, 71, 71½, 72, 72½, 73, 73½, 74, 74½, 75, 75½, 76, 76½, 77, 77½, 78, 78½, 79, 79½, 80, 80½, 81, 81½, 82, 82½, 83, 83½, 84, 84½, 85, 85½, 86, 86½, 87, 87½, 88, 88½, 89, 89½, 90, 90½, 91, 91½, 92, 92½, 93, 93½, 94, 94½, 95, 95½, 96, 96½, 97, 97½, 98, 98½, 99, 99½, 100, 100½, 101, 101½, 102, 102½, 103, 103½, 104, 104½, 105, 105½, 106, 106½, 107, 107½, 108, 108½, 109, 109½, 110, 110½, 111, 111½, 112, 112½, 113, 113½, 114, 114½, 115, 115½, 116, 116½, 117, 117½, 118, 118½, 119, 119½, 120, 120½, 121, 121½, 122, 122½, 123, 123½, 124, 124½, 125, 125½, 126, 126½, 127, 127½, 128, 128½, 129, 129½, 130, 130½, 131, 131½, 132, 132½, 133, 133½, 134, 134½, 135, 135½, 136, 136½, 137, 137½, 138, 138½, 139, 139½, 140, 140½, 141, 141½, 142, 142½, 143, 143½, 144, 144½, 145, 145½, 146, 146½, 147, 147½, 148, 148½, 149, 149½, 150, 150½, 151, 151½, 152, 152½, 153, 153½, 154, 154½, 155, 155½, 156, 156½, 157, 157½, 158, 158½, 159, 159½, 160, 160½, 161, 161½, 162, 162½, 163, 163½, 164, 164½, 165, 165½, 166, 166½, 167, 167½, 168, 168½, 169, 169½, 170, 170½, 171, 171½, 172, 172½, 173, 173½, 174, 174½, 175, 175½, 176, 176½, 177, 177½, 178, 178½, 179, 179½, 180, 180½, 181, 181½, 182, 182½, 183, 183½, 184, 184½, 185, 185½, 186, 186½, 187, 187½, 188, 188½, 189, 189½, 190, 190½, 191, 191½, 192, 192½, 193, 193½, 194, 194½, 195, 195½, 196, 196½, 197, 197½, 198, 198½, 199, 199½, 200, 200½, 201, 201½, 202, 202½, 203, 203½, 204, 204½, 205, 205½, 206, 206½, 207, 207½, 208, 208½, 209, 209½, 210, 210½, 211, 211½, 212, 212½, 213, 213½, 214, 214½, 215, 215½, 216, 216½, 217, 217½, 218, 218½, 219, 219½, 220, 220½, 221, 221½, 222, 222½, 223, 223½, 224, 224½, 225, 225½, 226, 226½, 227, 227½, 228, 228½, 229, 229½, 230, 230½, 231, 231½, 232, 232½, 233, 233½, 234, 234½, 235, 235½, 236, 236½, 237, 237½, 238, 238½, 239, 239½, 240, 240½, 241, 241½, 242, 242½, 243, 243½, 244, 244½, 245, 245½, 246, 246½, 247, 247½, 248, 248½, 249, 249½, 250, 250½, 251, 251½, 252, 252½, 253, 253½, 254, 254½, 255, 255½, 256, 256½, 257, 257½, 258, 258½, 259, 259½, 260, 260½, 261, 261½, 262, 262½, 263, 263½, 264, 264½, 265, 265½, 266, 266½, 267, 267½, 268, 268½, 269, 269½, 270, 270½, 271, 271½, 272, 272½, 273, 273½, 274, 274½, 275, 275½, 276, 276½, 277, 277½, 278, 278½, 279, 279½, 280, 280½, 281, 281½, 282, 282½, 283, 283½, 284, 284½, 285, 285½, 286, 286½, 287, 287½, 288, 288½, 289, 289½, 290, 290½, 291, 291½, 292, 292½, 293, 293½, 294, 294½, 295, 295½, 296, 296½, 297, 297½, 298, 298½, 299, 299½, 300, 300½, 301, 301½, 302, 302½, 303, 303½, 304, 304½, 305, 305½, 306, 306½, 307, 307½, 308, 308½, 309, 309½, 310, 310½, 311, 311½, 312, 312½, 313, 313½, 314, 314½, 315, 315½, 316, 316½, 317, 317½, 318, 318½, 319, 319½, 320, 320½, 321, 321½, 322, 322½, 323, 323½, 324, 324½, 325, 325½, 326, 326½, 327, 327½, 328, 328½, 329, 329½, 330, 330½, 331, 331½, 332, 332½, 333, 333½, 334, 334½, 335, 335½, 336, 336½, 337, 337½, 338, 338½, 339, 339½, 340, 340½, 341, 341½, 342, 342½, 343, 343½, 344, 344½, 345, 345½, 346, 346½, 347, 347½, 348, 348½, 349, 349½, 350, 350½, 351, 351½, 352, 352½, 353, 353½, 354, 354½, 355, 355½, 356, 356½, 357, 357½, 358, 358½, 359, 359½, 360, 360½, 361, 361½, 362, 362½, 363, 363½, 364, 364½, 365, 365½, 366, 366½, 367, 367½, 368, 368½, 369, 369½, 370, 370½, 371, 371½, 372, 372½, 373, 373½, 374, 374½, 375, 375½, 376, 376½, 377, 377½, 378, 378½, 379, 379½, 380, 380½, 381, 381½, 382, 382½, 383, 383½, 384, 384½, 385, 385½, 386, 386½, 387, 387½, 388, 388½, 389, 389½, 390, 390½, 391, 391½, 392, 392½, 393, 393½, 394, 394½, 395, 395½, 396, 396½, 397, 397½, 398, 398½, 399, 399½, 400, 400½, 401, 401½, 402, 402½, 403, 403½, 404, 404½, 405, 405½, 406, 406½, 407, 407½, 408, 408½, 409, 409½, 410, 410½, 411, 411½, 412, 412½, 413, 413½, 414, 414½, 415, 415½, 416, 416½, 417, 417½, 418, 418½, 419, 419½, 420, 420½, 421, 421½, 422, 422½, 423, 423½, 424, 424½, 425, 425½, 426, 426½, 427, 427½, 428, 428½, 429, 429½, 430, 430½, 431, 431½, 432, 432½, 433, 433½, 434, 434½, 435, 435½, 436, 436½, 437, 437½, 438, 438½, 439, 439½, 440, 440½, 441, 441½, 442, 442½, 443, 443½, 444, 444½, 445, 445½, 446, 446½, 447, 447½, 448, 448½, 449, 449½, 450, 450½, 451, 451½, 452, 452½, 453, 453½, 454, 454½, 455, 455½, 456, 456½, 457, 457½, 458, 458½, 459, 459½, 460, 460½, 461, 461½, 462, 462½, 463, 463½, 464, 464½, 465, 465½, 466, 466½, 467, 467½, 468, 468½, 469, 469½, 470, 470½, 471, 471½, 472, 472½, 473, 473½, 474, 474½, 475, 475½, 476, 476½, 477, 477½, 478, 478½, 479, 479½, 480, 480½, 481, 481½, 482, 482½, 483, 483½, 484, 484½, 485, 485½, 486, 486½, 487, 487½, 488, 488½, 489, 489½, 490, 490½, 491, 491½, 492, 492½, 493, 493½, 494, 494½, 495, 495½, 496, 496½, 497, 497½, 498, 498½, 499, 499½, 500, 500½, 501, 501½, 502, 502½, 503, 503½, 504, 504½, 505, 505½, 506, 506½, 507, 507½, 508, 508½, 509, 509½, 510, 510½, 511, 511½, 512, 512½, 513, 513½, 514, 514½, 515, 515½, 516, 516½, 517, 517½, 518, 518½, 519, 519½, 520, 520½, 521, 521½, 522, 522½, 523, 523½, 524, 524½, 525, 525½, 526, 526½, 527, 527½, 528, 528½, 529, 529½, 530, 530½, 531, 531½, 532, 532½, 533, 533½, 534, 534½, 535, 535½, 536, 536½, 537, 537½, 538, 538½, 539, 539½, 540, 540½, 541, 541½, 542, 542½, 543, 543½, 544, 544½, 545, 545½, 546, 546½, 547, 547½, 548, 548½, 549, 549½, 550, 550½, 551, 551½, 552, 552½, 553, 553½, 554, 554½, 555, 555½, 556, 556½, 557, 557½, 558, 558½, 559, 559½, 560, 560½, 561, 561½, 562, 562½, 563, 563½, 564, 564½, 565, 565½, 566, 566½, 567, 567½, 568, 568½, 569, 569½, 570, 570½, 571, 571½, 572, 572½, 573, 573½, 574, 574½, 575, 575½, 576, 576½, 577, 577½, 578, 578½, 579, 579½, 580, 580½, 581, 581½, 582, 582½, 583, 583½, 584, 584½, 585, 585½, 586, 586½, 587, 587½, 588, 588½, 589, 589½, 590, 590½, 591, 591½, 592, 592½, 593, 593½, 594, 594½, 595, 595½, 596, 596½, 597, 597½, 598, 598½, 599, 599½, 600, 600½, 601, 601½, 602, 602½, 603, 603½, 604, 604½, 605, 605½, 606, 606½, 607, 607½, 608, 608½, 609, 609½, 610, 610½, 611, 611½, 612, 612½, 613, 613½, 614, 614½, 615, 615½, 616, 616½, 617, 617½, 618, 618½, 619, 619½, 620, 620½, 621, 621½, 622, 622½, 623, 623½, 624, 624½, 625, 625½, 626, 626½, 627, 627½, 628, 628½, 629, 629½, 630, 630½, 631, 631½, 632, 632½, 633, 633½, 634, 634½, 635, 635½, 636, 636½, 637, 637½, 638, 638½, 639, 639½, 640, 640½, 641, 641½, 642, 642½, 643, 643½, 644, 644½, 645, 645½, 646, 646½, 647, 647½, 648, 648½, 649, 649½, 650, 650½, 651, 651½, 652, 652½, 653, 653½, 654, 654½, 655, 655½, 656, 656½, 657, 657½, 658, 658½, 659, 659½, 660, 660½, 661, 661½, 662, 662½, 663, 663½, 664, 664½, 665, 665½, 666, 666½, 667, 667½, 668, 668½, 669, 669½, 670, 670½, 671, 671½, 672, 672½, 673, 673½, 674, 674½, 675, 675½, 676, 676½, 677, 677½, 678, 678½, 679, 679½, 680, 680½, 681, 681½, 682, 682½, 683, 683½, 684, 684½, 685, 685½, 686, 686½, 687, 687½, 688, 688½, 689, 689½, 690, 690½, 691, 691½, 692, 692½, 693, 693½, 694, 694½, 695, 695½, 696, 696½, 697, 697½, 698, 698½, 699, 699½, 7	